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ABSTRACT

2025 SPR Annual Meeting

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SOCIETY FOR PSYCHOPHYSIOLOGICAL RESEARCH

An international society that fosters research relating to psychology and physiology.

PSYCHOPHYSIOLOGY

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VOLUME 62 NUMBER S1

2025 Annual Meeting of the Society for Psychophysiological Research

Pre-Conference Workshops: Tuesday, October 14-Wednesday, October 15, 2025

Annual Meeting: Wednesday, October 15-Saturday, October 18, 2025

Website: www.sprweb.org

This Supplement contains the abstracts from each presentation in the Symposia, Discussion Panels, Open Topic Symposia, and Poster Sessions being presented at the 2025 SPR Annual Meeting scheduled for October 15-October 18.

All authors are listed in the Index to Abstract Authors. In addition, abstract topics are listed in the Index to Abstract Descriptors.

The 2025 Annual Meeting Program includes three Pre-Conference Workshops, three Invited Addresses, one Presidential Address, three Early Career Award Addresses, and multiple Symposia. Specific research topics will be covered in the Symposia.

The majority of the research reports will be discussed at the three Poster Sessions.

I would like to thank all contributors for sharing their research and making this year's Annual Meeting a rich and stimulating event!

Annmarie MacNamara

2025 Program Committee Chair

Program Committee (2024–2025)

2025 Program Committee

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Program Highlights

Tuesday, October 14, 2025

8:00 a.m. – 5:00 p.m.

Registration/Check-in

8:00 a.m. – 5:00 p.m.

Pre-Conference Workshop 1 (available at an additional fee)

EEG Synchronization in Time, Frequency, and Space

Mike X. Cohen, PhD, Sincxpress Education SRL

9:00 a.m. – 5:00 p.m.

Wednesday, October 15, 2025

8:00 a.m. – 5:00 p.m.

Registration / Check-in

8:00 a.m. – 5:00 p.m.

Pre-Conference Workshop 1 (Continued)

EEG Synchronization in Time, Frequency, and Space

Mike X. Cohen, PhD, Sincxpress Education SRL

9:00 a.m. – 4:00 p.m.

Pre-Conference Workshop 2 (available at an additional fee)

Best Practices in HRV Research

Mika P. Tarvainen, PhD, Department of Technical Physics, University of Eastern Finland, and CEO, Kubios Oy

9:00 a.m. – 5:00 p.m.

Pre-Conference Workshop 3 (available at an additional fee)

Neuromodulation for Advancing Psychophysiology in the Laboratory and Clinic: rTMS for Probing and Modulating

Lisa M. McTeague, PhD, Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina

Jayce Doose, MEng, MUSC Center for Biomedical Imaging

9:00 a.m. – 5:00 p.m.

Opening Reception & Poster Session I

5:00 p.m. – 7:00 p.m.

Exhibit Hall

5:00 p.m. – 7:00 p.m.

Thursday, October 16, 2025

7:00 a.m. – 6:30 p.m.

Registration

7:00 a.m. – 6:30 p.m.

Speed Networking Breakfast

7:30 a.m. – 8:30 a.m.

Symposium 1.1: "FREE YOUR MIND": UNVEILING EMOTIONAL RESPONSES IN IMMERSIVE WORLDS

8:45 a.m. – 10:15 a.m.

Symposium 1.2: THE ROLE OF PARENTAL STRESS IN RELATIONS AMONG PARENTING, PARENT-CHILD RSA SYNCHRONY, AND CHILDREN'S BIOBEHAVIORAL SELF-REGULATION

8:45 a.m. – 10:15 a.m.

Symposium 1.3: LEVERAGING PSYCHOPHYSIOLOGY TO ADVANCE PERSONALIZED EXERCISE-BASED INTERVENTIONS FOR MENTAL HEALTH

8:45 a.m. – 10:15 a.m.

Symposium 1.4: BIG IDEA - ADVANCING CAUSAL INFERENCE IN PSYCHOPHYSIOLOGICAL RESEARCH

8:45 a.m. – 10:15 a.m.

Exhibit Hall

10:00 a.m. – 8:30 p.m.

Refreshment Break

10:15 a.m. – 10:45 a.m.

WISE Mentor Program

10:15 a.m. – 11:00 a.m.

Welcome Remarks - Dr. Christine Larson, SPR President

10:50 a.m. – 11:00 p.m.

Invited Keynote Address - Dr. Diego Pizzagalli

11:00 a.m. – 12:00 p.m.

Lunch

12:00 p.m. – 1:30 p.m.

Women in Science and Education (WISE) Lunch

12:00 p.m. – 1:30 p.m.

Program Committee Lunch (Invitation Only)

12:15 p.m. – 1:15 p.m.

Symposium 2.1: TOWARDS NEW PERSPECTIVES ON BODY-BRAIN DYNAMICS: INNOVATIONS IN MEASUREMENT AND CLINICAL IMPLICATIONS

1:30 p.m. – 3:00 p.m.

Symposium 2.2: BEYOND AVERAGES: TRIAL-BY-TRIAL APPROACHES TO NEURAL AND BEHAVIORAL DYNAMICS

1:30 p.m. – 3:00 p.m.

Symposium 2.3: INFANT ELECTROPHYSIOLOGY: METHODOLOGICAL ADVANCES TOWARDS DEFINING EARLY COGNITIVE DEVELOPMENT

1:30 p.m. – 3:00 p.m.

Symposium 2.4: BRIDGING MINDS AND TECHNOLOGY: ADVANCEMENTS IN USING BRAIN-BASED METHODS TO BETTER UNDERSTAND AND TREAT DEPRESSIVE DISORDERS

1:30 p.m. – 3:00 p.m.

Refreshment Break

3:00 p.m. – 3:30 p.m.

Symposium 3.1: HEART-EVOKED POTENTIALS, INTEROCEPTION, AND THE ROLE OF RESPIRATION

3:30 p.m. – 5:00 p.m.

Symposium 3.2: UNSEEN STRUGGLES: PSYCHOPHYSIOLOGICAL INSIGHTS INTO DISCRIMINATION AND RISK BIOMARKERS IN MINORIZED GROUPS

3:30 p.m. – 5:00 p.m.

Symposium 3.3: RESTING-STATE RENAISSANCE: LEVERAGING RESTING-STATE NEURAL MEASURES TO UNDERSTAND ADOLESCENT INTERNALIZING PSYCHOPATHOLOGY

3:30 p.m. – 5:00 p.m.

Symposium 3.4: PSYCHOPHYSIOLOGICAL INVESTIGATION OF MECHANISMS OF HARMFUL SUBSTANCE USE

3:30 p.m. – 5:00 p.m.

Faces of the Future Flash Talks

5:10 p.m. – 6:30 p.m.

Poster Session II

6:30 p.m. – 8:30 p.m.

Past President's Dinner (Offsite & Invitation Only)

8:30 p.m. – 9:30 p.m.

Student Social (Offsite)

9:00 p.m. – 11:00 p.m.

Friday, October 17, 2025

7:00 a.m. – 6:30 p.m.

Registration

7:00 a.m. – 6:30 p.m.

Psychophysiology's "Meet the Editors"

7:30 a.m. – 8:30 a.m.

Symposium 4.1: NAVIGATING INTEROCEPTIVE CROSSROADS: THE INTERPLAY OF BODILY SIGNALS, EMOTION, AND STRESS

8:45 a.m. – 10:15 a.m.

Symposium 4.2: BIOPSYCHOSOCIAL PERSPECTIVES ON EMOTION REGULATION: INDIVIDUAL DIFFERENCES, INTERVENTIONS, AND META-ANALYTIC INSIGHTS

8:45 a.m. – 10:15 a.m.

Symposium 4.3: EXPANDING THE MULTIVERSE: APPLIED EXAMPLES AND THE GROWING IMPACT OF MULTIVERSE ANALYSES IN PSYCHOPHYSIOLOGICAL RESEARCH

8:45 a.m. – 10:15 a.m.

Symposium 4.4: WIRED FOR CONNECTION: PHYSIOLOGICAL SYNCHRONY AND SOCIAL REGULATION ACROSS THE LIFESPAN

8:45 a.m. – 10:15 a.m.

Exhibit Hall

10:00 a.m. – 8:30 a.m.

Refreshment Break

10:15 a.m. – 10:45 a.m.

Invited Keynote Address - Dr. Dani S. Bassett

10:45 a.m. – 11:45 a.m.

Lunch

11:45 a.m. – 1:15 p.m.

Education & Training Committee Roundtables

11:45 a.m. – 1:15 p.m.

Psychophysiology, Engineering, and Human-Factors Luncheon

11:45 a.m. – 1:15 p.m.

Committee Lunches (Invitation Only)

11:45 p.m. – 1:15 p.m.

Symposium 5.1: FROM THE MICROSYSTEM TO THE EXOSYSTEM: ECOLOGICAL INFLUENCES ON NEURODEVELOPMENT ACROSS INFANCY, CHILDHOOD, AND ADOLESCENCE

1:15 p.m. – 2:45 p.m.

Symposium 5.2: ADVANCES IN THE ANALYSIS OF OSCILLATORY BRAIN ACTIVITY

1:15 p.m. – 2:45 p.m.

Symposium 5.3: THE DYNAMICS OF THREAT AND SAFETY LEARNING: INFLUENCES OF INDIVIDUAL DIFFERENCES AND CONTEXTUAL FACTORS

1:15 p.m. – 2:45 p.m.

Symposium 5.4: BIG IDEA - PRECISION PSYCHOPHYSIOLOGY AND MULTIMODAL BIOMARKERS

1:15 p.m. – 2:45 p.m.

Student Coffee Hour

2:15 p.m. – 3:15 p.m.

Refreshment Break

2:45 p.m. – 3:15 p.m.

Early Career Award Talks

3:15 p.m. – 4:45 p.m.

5th Annual President's Symposium on Diversity and Representation

5:00 p.m. – 6:30 p.m.

Poster Session III

6:30 p.m. – 8:30 p.m.

Student Committee Meeting

8:30 p.m. – 9:30 p.m.

Saturday, October 18, 2025

8:00 a.m. – 3:00 p.m.

Registration

8:00 a.m. – 3:00 p.m.

Symposium 6.1: THE TRANSDIAGNOSTIC ROOTS OF INTERNALIZING PSYCHOPATHOLOGY: A RESEARCH DOMAIN CRITERIA (RDOC) PERSPECTIVE

8:45 a.m. – 10:15 a.m.

Symposium 6.2: THE IMPACTS OF SLEEP AND PHYSIOLOGY ON INTERNALIZING SYMPTOMS DURING ADOLESCENCE AND THE PERIPARTUM PERIOD

8:45 a.m. – 10:15 a.m.

Symposium 6.3: PHYSIOLOGICAL SYNCHRONY AND INTIMACY IN CLOSE ROMANTIC RELATIONSHIPS

8:45 a.m. – 10:15 a.m.

Symposium 6.4: CONTRIBUTING TO RIGOR AND REPRODUCIBILITY IN THE PEER REVIEW PROCESS: A WORKSHOP FOR EARLY CAREER REVIEWERS

8:45 a.m. – 10:15 a.m.

Coffee Break

10:15 a.m. – 10:45 a.m.

Invited Keynote Address - Dr. Michelle G. Craske

10:45 a.m. – 11:45 a.m.

Presidential Address - Dr. Christine Larson

12:00 p.m. – 1:00 p.m.

Awards Luncheon & Business Meeting

1:00 p.m. – 3:00 p.m.

Saturday Night Social (25th Anniversary of the SPR Blues Band)

9:00 p.m. – 11:59 p.m.

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ABSTRACT

SYMPOSIA

***Symposium* I-1**

"FREE YOUR MIND": UNVEILING EMOTIONAL RESPONSES IN IMMERSIVE WORLDS

Chair: Marta Andreatta[1]; Co-Chair: Antonin Fourcade[2]
[1]University Hospital Tuebingen, [2]Max Planck Institute for Human Cognitive and Brain Sciences

Emotions shape behaviors and decisions. Virtual reality (VR) is a powerful tool to study mental processes in highly controlled yet immersive environments. This symposium aims to showcase the diverse applications of VR in emotion and psychophysiology research. Fourcade will start presenting a multimodal dataset to study dynamics of affective states. A proof-of-concept analysis on continuous self-reports, ECG and EEG data identified four psychophysiological states during a 23-min emotional VR experience. de Vries will demonstrate the relation between gaze patterns and decision making under proximal vs. distal, as well as human vs. non-human naturalistic threats. Grimshaw will report how attentional tasks can effectively reduce subjective, physiological (heart rate) and behavioral (movements) fear while walking on a virtual plank. Posthuma will present a VR-biofeedback training, which improves heart rate variability not only during the virtual training but also in tasks outside the virtual context. Follow-up assessments revealed sustained improvements in self-reported stress regulation and breathing awareness. Andreatta will conclude with a clinical study comparing the responses of anxiety patients and healthy controls in VR. Patients' verbal anxiety was efficiently reduced by exposure therapy but not the physiological anxiety (startle reflex). Using VR, we were able to integrate verbal and physiological responses with realistic behaviors providing a holistic understanding of underlying and pathological emotional processes.

STUDYING DYNAMICS AND PHYSIOLOGY OF AFFECTIVE STATES IN IMMERSIVE VIRTUAL REALITY

Antonin Fourcade[1], Francesca Malandrone[2], Lucy Roellecke[1], Anthony Ciston[1], Jeroen de Mooij[1], Arno Villringer[1], Sara Carletto[2], Michael Gaebler[1]
[1]Max Planck Institute for Human Cognitive and Brain Sciences, [2]University of Turin

Affective states (e.g., emotions) are psychophysiological phenomena involving interactions between subjective experiences, physiological processes, and external contexts. They fluctuate over time and need to be studied with a more integrated network physiology approach. Immersive Virtual Reality (iVR) is a good trade-off between control and naturalism, allowing researchers to elicit more authentic emotions while recording multimodal and high-quality physiological data. We recorded a comprehensive dataset of psycho-physio-behavioral responses from 47 healthy adults (24 female, age range 18–40 years), including continuous affective (valence and arousal) ratings, multimodal physiological activity (64-channel EEG; ECG, respiration, photoplethysmography, skin conductance, pupillometry) and head/eye movements, collected during a naturalistic (3D-360°, dynamic) 23-min emotional experience in iVR. As a proof of concept, Hidden Markov Modelling (HMM) was used to identify time-resolved and latent psychophysiological states. HMM of (1) self-reports distinguished four valence-arousal states with distinct patterns in heart and brain activity, and HMM of (2) EEG and ECG data extracted four distinct neuro-cardiac states. This dataset, which we plan to make openly available soon, paves the way to further investigate the physiology of affective states with a more naturalistic, dynamic and integrated perspective.

FUNDING: This research was supported by the Max Planck Dahlem Campus of Cognition (MPDCC) and funded by the Max Planck Society - Fraunhofer-Gesellschaft cooperation (project "NEUROHUM") and the German Federal Ministry of Education and Research (BMBF grant 13GW0488). This project was also funded by the Grant for Internationalization of the Department of Clinical and Biological Sciences, University of Turin, Italy (CARS_GFI_22_01_F and CARS_RILO_22_03_F).

FACING DANGER: GAZE PATTERNS AND ESCAPE DECISIONS UNDER NATURALISTIC THREATS

Olivier de Vries, Julianna Sporrer, Dominik Bach
University of Bonn

Under threat of attack, gaze direction towards critical features can be key to survival. This is far from trivial, as the optimal gaze pattern for the acquisition of relevant information depends strongly on situational factors, such as the presence of escape routes and proximity to the threat. The importance of understanding how gaze patterns relate to decision making is highlighted by studies suggesting that attentional biases towards threat features are markers, or even causal mechanisms, of multiple anxiety disorders. However, few studies to date have investigated such effects in naturalistic settings that allow active sensing, free movement, and unconstrained planning of escape actions. We conducted a series of experiments in virtual reality that expose participants to a variety of threatening scenarios, and continuously recorded gaze direction and full-body motion. We found that gaze is oriented more towards distal threats relative to proximal threats. For proximal threats, participants instead tended to orient gaze towards a safe location that is the target of their escape. Additionally, we found decreased gaze dispersion when facing human threats as compared to predators that were equally fast and dangerous in our paradigm, corroborating earlier studies showing that gaze is particularly drawn to other humans. These results are a first step towards charting the phenomena of gaze direction and escape decisions under naturalistic threats.
FUNDING: European Research Council (ERC), Grant agreement ID: 816564

RECIPROCAL RELATIONS BETWEEN FEAR AND ATTENTION IN A VIRTUAL PLANK-WALK

Gina Grimshaw[1], Christopher Maymon[1], Damian Tjiptono[1], Madison Jones[1], Tim Gastrell[2], David Carmel[1]
[1]Victoria University of Wellington, [2]University of Queensland

Fear and attention are intimately linked, but the nature of their relationship is still a mystery. Capacity theories suggest that fear consumes cognitive resources and should interfere with attentional control, while theories of attentional scope suggest that fear should narrow attention, improving attentional control. At the same time, theories of emotion regulation suggest that engaging in a task of attentional control is a form of distraction and should therefore reduce fear. Virtual reality affords us the ability to track changes in both fear and attention over time in a highly controlled yet ecologically valid environment. We can therefore examine the effects of fear on attentional control, and the effects of attentional control on fear. In a series of studies, participants complete a flanker task (to assess attentional control) while standing on a virtual plank suspended high above a city street. Stepping onto the plank reliably produces strong feelings of fear and increases in heart rate and skin conductance. Surprisingly, fear has no effect on flanker task performance at the beginning of the task, when fear is highest. However, attentional control improves over time. In contrast, the effects of attentional control on fear are immediate. During task performance, heart rate returns to baseline levels along with more modest reductions in subjective fear and skin conductance. Studies like these point to the potential for virtual reality to address age-old questions about the relationship between body, mind, and behaviour.
FUNDING: Royal Society of New Zealand Marsden Fund

GAMIFIED VIRTUAL REALITY HEART RATE VARIABILITY BIOFEEDBACK TRAINING IMPROVES PERFORMANCE UNDER STRESS AND REDUCES AVOIDANCE BEHAVIOUR

Jonathan Posthuma
Radboud Universiteit

Enhancing heart rate variability (HRV) has been linked to numerous benefits, including reduced anxiety and improved stress management. Theoretical frameworks suggest that HRV upregulation facilitates behavioral coping with stressors and threats by improving cognitive control and reducing excessive avoidance, few controlled experiments have directly examined the causal impact of HRV manipulations on behaviour or studied long term effects. In this study, we utilized a gamified VR-HRVBF training protocol to investigate how voluntary HRV upregulation could benefit behavioral performance and long-term stress regulation. Fifty-six participants completed a two-day VR-HRVBF training and a battery of tasks outside VR before and after training assessing avoidance behaviour, stress-induced performance, and impulse control. Fifty-one control participants performed the same tasks without receiving training. The VR-HRVBF game led to strong improvements in voluntary HRV control, with participants doubling their HRV while in VR. Critically, compared to controls, the experimental group exhibited significant HRV improvements during two out of three tasks, along with enhanced mental arithmetic performance and reduced costly avoidance behaviour. Follow-up assessments revealed lasting training-induced improvements in both reported breathing awareness and stress regulation one month post-training. Overall, our findings demonstrate that gamified HRV biofeedback can not only enhance HRV control in arousing contexts, but can also change behavior and improve long-term stress regulation.

AMELIORATION OF EXAGGERATED VERBAL, BUT NOT PHYSIOLOGICAL FEAR IN ANXIETY PATIENTS AFTER TREATMENT: A TEST IN VR

Marta Andreatta
University Hospital Tuebingen

Anxiety disorders are the most prevalent mental disorders and are characterized by an incapacity to detect safety, responding anxiously in numerous situations. Circa 30-40% of the patients show relapses of the symptoms after therapy. In this study, we investigated the long-lasting effects of exposure therapy. Eighty-nine patients and 37 healthy controls underwent context conditioning in virtual reality. During an acquisition phase, a loud female scream (unconditioned stimulus, US) was unpredictably presented in one virtual office (threatening context, CTX+) but never in the other office (safe context, CTX-). During an

extinction phase, which followed, participants revisited the two contexts, and the US was never delivered. Twenty-eight patients were then retested after treatment. Compared to healthy controls, patients demonstrated startle potentiation in CTX- but reported higher subjective anxiety in CTX+. Moreover, patients did not reduce their conditioned anxiety and kept showing stronger defensive verbal as well as physiological responses during extinction training. After exposition therapy, subjective anxiety was significantly reduced at the end of the extinction phase but not patients' physiological responses. In summary, extinction of the conditioned anxiety was ameliorated in patients after exposure therapy, but only on the verbal and not on the physiological level. Both the stronger defensive responses in a safe context and the dissociation between the two levels of responses during extinction training might be implicated in the relapses of the symptoms.
FUNDING: German Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung, BMBF), Grant/Award Number: FKZ 01EE1402A

***Symposium* I-2**

THE ROLE OF PARENTAL STRESS IN RELATIONS AMONG PARENTING, PARENT-CHILD RSA SYNCHRONY, AND CHILDREN'S BIOBEHAVIORAL SELF-REGULATION

Chair & Discussant: Erika Lunkenheimer
The Pennsylvania State University

Early stress has myriad negative effects on children's self-regulation development, often transmitted via compromised neurobiological functioning. Parental stress is a particularly critical risk factor as it disrupts the security and safety of the primary caregiving context that shapes children's regulatory development. Parent-child synchrony of respiratory sinus arrhythmia (RSA) has emerged as a biological mechanism by which parenting risk contributes to children's dysregulation, but the role of parental stress in this link is not yet clear. This symposium tackles this issue using observational and real-time dynamic analytic methods, addressing how parents' perceived stress and physiological stress reactivity contribute to parenting risk, dyadic RSA synchrony, and infants' and preschoolers' biobehavioral self-regulation. Paper 1 shows emotionally reactive mothers with blunted RSA predict infant distress (RSA), while emotionally reactive fathers with more RSA arousal predict infant distress. Paper 2 discovers four dyadic profiles of mother-child RSA stress reactivity, with mothers in dyadic blunted profiles showing more negative parenting concurrently and 1 year later compared to a maternal-buffering profile. Paper 3 finds when parents' perceived stress is lower, higher RSA synchrony predicts children's better behavioral regulation in the lab and at school, but at higher stress, predicts poorer regulation. Paper 4 shows when parents have fewer life stressors, greater RSA synchrony predicts children's better emotion regulation and RSA recovery post-stressor 1 year later.

PARENTAL EMOTIONAL REACTIVITY AND INDIVIDUAL DIFFERENCES IN AVERAGE RSA SHAPE PARENT-INFANT RSA SYNCHRONY

Jill T. Krause, Hayley D. Seely, Samantha M. Brown
Colorado State University

Infancy is a critical period for developing regulatory skills. Respiratory sinus arrhythmia (RSA) coregulation between parents and infants plays a key role in infant self-regulation and development. However, high-stress environments, such as parents with high emotional reactivity, may impact RSA coregulation. This study examined how parent-infant RSA coregulation varies based on individual differences in average RSA and parental emotional reactivity.
Participants included 57 parent-infant dyads (31 mothers, 26 fathers). Dyads completed a Still Face paradigm, alternating between play and stress conditions, with RSA measured in 30-second epochs. Parents completed self-report measures of emotional reactivity. State-trait multilevel models examined whether parent-infant RSA synchrony—the moment-to-moment (state) association between parent and infant RSA reactivity—varied based on average (trait) RSA levels and parental emotional reactivity.
Findings revealed that higher maternal state RSA predicted lower infant state RSA when both maternal emotional reactivity and maternal average RSA were higher ($b=-.004$, $p<.05$). While mothers with high-risk may be more disengaged during challenge, leading to infant distress, father-infant mutual distress appears more prominent in high-risk contexts. These findings offer novel insights into how RSA coregulation functions in high-stress environments and the role of individual differences in RSA.
While mothers with high-risk may be more disengaged during challenge, leading to infant distress, father-infant mutual distress appears more prominent in high-risk contexts. These findings offer novel insights into how RSA coregulation functions in high-stress environments and the role of individual differences in RSA.
FUNDING: This study was funded by National Institutes of Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development (R03HD103746)

PERSON-CENTERED PROFILES OF DYADIC MOTHER-CHILD RSA REACTIVITY AND ASSOCIATIONS WITH NEGATIVE PARENTING

Jianing Sun, Erika Lunkenheimer
The Pennsylvania State University

Parent and child respiratory sinus arrhythmia (RSA) reactivity and coregulation underlie children's emerging emotion regulation but are disrupted by parenting risk (Lunkenheimer et al., 2023). However, prior variable-centered RSA coregulation findings cannot tease apart the level and direction of RSA change in each partner, making person-centered approaches a critical next step in understanding how parent and child dyadic RSA stress reactivity relates to parenting risk. We examined dyadic profiles of mother-child RSA stress reactivity trajectories during a challenging puzzle task, and tested associations with negative

parenting. Participants were 154 mother-child dyads at child age 3 (53% female; 78.6% White). A parallel-process latent class growth model revealed four dyadic RSA stress response profiles: co-reactive (n=46; 29.87%), co-blunted low RSA (n=20; 12.99%), co-blunted high RSA (n=36, 23.28%), and mother reactive-child buffered (n=52, 33.77%). Co-blunted high RSA dyads were more likely to have higher maternal hostility concurrently and one year later compared to dyads in the mother reactive-child buffered profile. Co-blunted low RSA dyads were more likely to have higher maternal hostility concurrently compared to dyads in the mother reactive-child buffered profile, and marginally higher maternal laxness one year later compared to dyads in the mother reactive-child buffered and co-reactive profiles. Findings suggest a dyadic person-centered approach to physiological stress reactivity can shed new light on parenting risk factors in children's regulatory development.
FUNDING: This study was funded by the National Institute of Child Health and Human Development (K01HD068170, R01HD097189) awarded to EL.

THE ASSOCIATIONS BETWEEN PARENT-CHILD PHYSIOLOGICAL SYNCHRONY AND CHILDREN'S SELF-REGULATION: THE ROLE OF PARENT PERCEIVED STRESS

Yingying Tang, Tose Akinmola-Milone, Amy Bryan, Nicole Perry
The University of Texas At Austin

The caregiving context shapes child self-regulation, often through social interactions during which parents and children are engaged in physiologically synchronous patterns. Because higher parental stress is associated with less sensitive and attuned parenting, we investigate whether parental stress moderates the link between parent-child physiological synchrony and children's self-regulation behavior. The sample included 57 children and parents (51% girls; Mage=4.26 years). Parents and children wore electrocardiogram (ECG) stickers during a problem-solving task and respiratory sinus arrhythmia (RSA) was collected. Parents completed the Perceived Stress Scale (PSS; Cohen et al., 1993). Children's emotion regulation behaviors (distraction and venting) were coded during an independent frustration task while their challenging and self-regulatory behaviors were live-coded in the classroom. A coupled autoregressive multilevel model was used to estimate lagged RSA synchrony. Moderation analysis found that perceived stress moderated links between child-to-parent synchrony and children's challenging (β=2.46, p=.016) and self-regulatory (β=-2.46, p=.015) behaviors in their preschool classrooms, and venting behaviors (β=10.96, p=.001) in the frustration task. At low parental stress, greater parent-child RSA synchrony was linked to fewer challenging behaviors (β=-19.03, p=.005), greater self-regulation (β=18.68, p=.005), and fewer venting behaviors (β=-47.70, p=.027). At high parental stress, greater parent-child RSA synchrony was related to more venting behaviors (β=64.42, p=.008).

MOTHER-PRESCHOOLER RSA SYNCHRONY AND CHILDREN'S EMOTION REGULATION DEVELOPMENT ACROSS VARYING LEVELS OF FAMILY STRESS

Longfeng Li
Florida State University

Parent-child synchrony of respiratory sinus arrhythmia (RSA) plays a crucial role in transmitting family stress and shaping child regulatory development (Feldman, 2007; Lunkenheimer et al., 2022). To better understand how RSA synchrony shapes child development in varying contexts, this study examined whether mother-child RSA synchrony functioned adaptively or maladaptively in child emotion regulation development, depending on family stress levels.
Participants were 150 mother-child dyads oversampled for familial risk. Children's emotion regulation at ages 3 and 4 years were assessed using the mother-rated Emotion Regulation Checklist (Shields & Cicchetti, 1997) and physiological biomarkers, including RSA reactivity and recovery during a challenging parent-child puzzle task (Lunkenheimer et al., 2017). Mother-child RSA synchrony at age 3 was computed as concurrent within-dyad RSA synchrony during the task. Family stress at age 3 was assessed using mother-reported stressful life events (Holmes & Rahe, 1967). Results showed that mother-child RSA synchrony at age 3 predicted better emotion regulation and greater RSA recovery at age 4 in families experiencing lower stress, whereas these associations were negative but non-significant in families with higher stress, controlling for age 3 emotion regulation or RSA recovery, family socioeconomic status, child sex, and race/ethnicity. These findings suggest that parent-child RSA synchrony supports children's regulatory development in lower-stress families but may be less beneficial—or even maladaptive—in higher-stress families.
FUNDING: K01; R01; NIH

***Symposium* I-3**

LEVERAGING PSYCHOPHYSIOLOGY TO ADVANCE PERSONALIZED EXERCISE-BASED INTERVENTIONS FOR MENTAL HEALTH

Chair: C.J. Brush[1]; Discussant: Brandon Alderman[2]
University of Idaho[1], Rutgers University[2]

Dysfunction in cognitive-affective processing is a core feature of many psychiatric and neurocognitive disorders and can be indexed via event-related potentials (ERPs). While exercise is recognized for its cognitive-affective benefits, its neurophysiological mechanisms are unclear. Elucidating ERPs modulated by exercise has implications for optimizing its use as a mechanistically driven intervention. This symposium will present research demonstrating how exercise influences ERP markers of cognitive-affective processes, with implications for identifying neurophysiological targets responsive to change across clinical and non-clinical populations. Aaron Kuznik will present data on how acute intense intermittent exercise disrupts cognitive control, indexed by N2 and P3, in healthy adults. Karly Knudson

will discuss how acute exercise affects inhibitory control, measured by the P3, in older adults with and without cognitive impairment. Kenan Sayers will discuss the effects of acute exercise on emotion regulation, focusing on the late positive potential and stimulus-preceding negativity in adults with elevated anxiety sensitivity. C.J. Brush will present data on how different exercise doses influence affective responses and reward- and cognitive-related ERPs in adults with depressive symptoms. Brandon Alderman will synthesize these findings and discuss their implications for exercise-based interventions. This session provides a mechanistic perspective on how exercise influences cognitive-affective processes, informing the refinement of personalized, evidence-based interventions.

FLUCTUATION IN INHIBITORY CONTROL DURING INTENSE INTERMITTENT EXERCISE

Aaron Kuznik, Shih-Chun Kao
Purdue University

Although research showed that inhibitory control (IC) impairs during intense exercise and improves during post-exercise recovery, it is unclear how such IC changes and related brain mechanisms fluctuate between exercise and recovery intervals within a single exercise session such as high-intensity interval training (HIIT). Understanding these dynamics is critical for refining exercise prescriptions to optimize cognitive function. Sixteen 18-25 years old participants completed a 30-min HIIT session alternating between three exercise (5-min at 80% max heart rate) and three recovery (5-min sitting) intervals or a 30-min sitting on a cycle ergometer on two counterbalanced days. During each 5-min interval, IC was assessed during a flanker task using behavioral performance (response time [RT]; accuracy [ACC]) and N2/P3 event-related potentials. Although no between-session differences in RT were observed, ACC for incongruent trials during exercise intervals was lower within the HIIT compared to sitting session. HIIT resulted in a larger N2 amplitude compared with sitting only during exercise intervals, however, a reduced P3 amplitude and delayed N2 and P3 latencies across exercise and recovery intervals were found during HIIT compared to sitting session. These findings not only replicate exercise-induced IC deficit corresponded with elevated conflicts, but also demonstrate recovery intervals as inadequate windows during HIIT to accrue post-exercise cognitive benefits due to decreased availability of attention resource and slowed conflict resolution and stimulus categorization.

ACUTE EXERCISE AND NEUROCOGNITIVE FUNCTION IN OLDER ADULTS WITH AND WITHOUT MILD COGNITIVE IMPAIRMENT

Karly Knudson[1], Melissa Meynadasy[2], Brittney Thompson[2], Greg Hajcak[3], C.J. Brush[4],
[1]Auburn University,[2]Florida State University, [3]Santa Clara University, [4]University of Idaho

Individuals with mild cognitive impairment (MCI) are at greater risk for major neurocognitive disorders, such as Alzheimer's Disease (AD) or dementia. Exercise has shown promise for enhancing cognitive function in both human and animal literature, with a possible role of preventing progression of cognitive decline into AD. Evidence indicates that exercise can enhance cognitive function among older adults; however, there is less research regarding the neural underpinnings of its effects. The current study aimed to assess the effects of a single bout of exercise on the P3 during a go/no-go-task among older adults who display MCI and those who are cognitively normal (CN). In a within-subjects crossover design, 91 participants (ages 60-85) completed 30 minutes of moderate-intensity exercise and seated rest on separate days in counterbalanced order. A go/no-go task was completed while electroencephalography was recorded before and after each condition. Exercise manipulation checks indicated that participants had elevated heart rates and perceived exertion, confirming sufficient implementation of the exercise protocol; however, exercise did not modulate behavioral performance (i.e., reaction time and accuracy) or P3 measures (i.e., amplitude or latency). These effects also did not vary as a function of MCI and CN status. Despite the commonly reported cognitive benefits of exercise, it is possible that a single bout may be insufficient to modulate the P3 in this population. Future work could consider whether a longer exercise dose is needed to elicit these benefits.
FUNDING: National Institute of Mental Health (5T32 MH093311-09)

A PSYCHOPHYSIOLOGICAL EXAMINATION OF EXERCISE'S EFFECT ON REAPPRAISAL PROCESSES AND SYMPTOMS OF PSYCHOPATHOLOGY

Kenan Sayers, Matthew Pontifex, Jason Moser
Michigan State University

Anxiety disorders are the most common mental disorders in the U.S. and rates have been steadily increasing in young adults (18-25 years old). Exercise has been shown to be effective at reducing anxiety sensitivity (AS), a transdiagnostic risk factor for anxiety disorders, but how exercise leads to these changes in AS remains unknown. This study examined whether cognitive reappraisal is a mechanism that explains exercise induced changes in AS. Using a randomized within-subjects crossover design in a sample of 65 college-aged females with elevated AS, measures of reappraisal and AS were assessed before and after 20-min of either an acute bout of moderate intensity aerobic exercise or a seated control condition during two separate, counterbalanced sessions. Participants completed an instructed reappraisal task while electroencephalogram (EEG) was recorded. The late-positive potential (LPP) was used as a measure of reappraisal effectiveness and the stimulus-preceding negativity (SPN) was used as an index of effort expenditure during reappraisal. Unexpectedly, results showed an increase in LPP amplitude during reappraisal trials after the exercise. Results also showed smaller LPP amplitudes when participants passively viewed anxiety-related images following exercise. No significant changes in SPN amplitude or self-reported AS were observed following exercise or the control session. Results indicate that an acute bout of aerobic exercise leads to changes in engagement with negative stimuli and emotional reactivity despite a lack of immediate reductions in AS symptoms.
FUNDING: National Science Foundation

ACUTE EXERCISE AND ITS EFFECTS ON REWARD- AND NEUROCOGNITIVE-RELATED ERPS IN ADULTS WITH DEPRESSIVE

C.J. Brush, Karly Knudson
University of Idaho

Research consistently documents the antidepressant effects of exercise; however, the neurophysiological mechanisms implicated in these effects remain unclear. Identification of relevant neurophysiological targets is critical to advance the role of exercise-based intervention in the management of depression. In this talk, data from studies assessing the effects of single bouts of aerobic exercise on event-related potential (ERP) indicators among adults with depressive symptoms will be explored. In an initial study, findings showed that moderate-intensity aerobic exercise failed to modulate reward processing in 66 adults with variable depressive symptoms; however, individual difference analyses revealed that those with intact reward processing (on a non-exercise day) reported the largest exercise-induced increases in positive affect. These results informed a second study that assessed the dose-dependent effects of exercise on affective responses as well as reward processing and neurocognitive function in 30 adults with mild-to-severe depressive symptoms. Participants completed both self-selected and moderate-intensity exercise sessions, with findings indicating greater reports of pleasure and modulation of reward processing in response to the self-selected exercise; both exercise doses led to enhanced neurocognitive function. This work highlights a nuanced relationship between exercise and its impact on neurophysiological targets relevant to depression, with implications for refining exercise-based interventions to improve clinical outcomes.
FUNDING: Huckabay Excellence Award Seed Funding at the University of Idaho

***Symposium* I-4**

BIG IDEA: ADVANCING CAUSAL INFERENCE IN PSYCHOPHYSIOLOGICAL RESEARCH

Chair: Michael Larson
Brigham Young University

Understanding cause and effect in the brain is one of the biggest challenges in psychophysiology. This symposium brings together innovative approaches that push beyond correlation to uncover causal relationships that are essential for clinical breakthroughs and scientific progress. We begin with a compelling presentation for using case-by-case analysis in psychophysiological research and application, a method rooted in early experimental psychology, to reveal consistent individual effects that group averages may overlook. Next, we explore how neuromodulation can restore disrupted error processing in opioid use disorder, showing potential for brain-based treatment targets. We then examine how causal modeling can reveal the distinct impact of environmental exposures, such as prenatal tobacco use and screen time, on brain network dynamics in children. The final two talks highlight personalized neuroscience in action: from tailoring rTMS for depression to precision-targeted ERP measures that link brain activity with real-world behaviors. Together, these Big Idea talks offer fresh, practical strategies to strengthen causal inference in psychophysiological science and improve potential precision in both research and clinical application.

REVEALING CAUSE-AND-EFFECT RELATIONSHIPS THROUGH CASE-BY-CASE ANALYSIS

Harald Schupp
University of Konstanz

In psychophysiology, the dominant methodology to reveal cause-and-effect relationships is the group approach. Its value is widely recognized; doubts regarding the replication of findings have led to calls for improvements, such as larger samples, more replication studies, and pre-registration of protocols. Here, a complementary methodology is considered: the case-by-case approach, once championed by Wundt, Pavlov, Skinner, and other pioneers. The difference between the group and case-by-case approaches concerns the unit of analysis on which empirical regularities are based. While group research refers to a hypothetical person - the group average - the case-by-case approach can reveal empirical regularities common to all individuals. Knowing how many individuals show an effect clarifies cause-and-effect relationships: findings replicated in the vast majority of cases provide a robust foundation, while less consistent results indicate a need for revision and refinement. The case-by-case analysis is also a promising methodological approach for neural biomarker development and clinical translation, offering fast and cost-effective cycles of paradigm development and optimization. It can lead to reproducible findings and alleviate the group-to-individual generalization problem. Using a series of studies on electrophysiological markers of motivated and voluntary attention as an example, the value of the case-by-case approach to reveal cause-and-effect relationships is discussed, alongside its limitations and pitfalls.
FUNDING: Deutsche Forschungsgemeinschaft

NEUROMODULATION NORMALIZES BOTH fMRI AND ERP MEASURES OF ERROR PROCESSING IN OPIOID USE DISORDER: A POTENTIAL TREATMENT TARGET

Dongyu Kang[1], Michael Stevens[1], Vaughn Steele[2]
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Dysregulation of error processing, specifically hypoactivation in the anterior cingulate cortex (ACC), is a hallmark of substance use disorders. Normalizing this signal could lead to an effective treatment, especially for individuals receiving methadone to treat opioid use disorder (MOUD). Intermittent theta burst stimulation (iTBS), a form of neuromodulation, applied to the left dorsolateral prefrontal cortex (l-dlPFC) may modulate the ACC error signal. We hypothesized that a single session of iTBS applied to the l-dlPFC would normalize the ACC in MOUD participants. We recruited two functional magnetic resonance imaging

(fMRI) cohorts, MOUD (N=30) controls (N=31), and one event-related potentials (ERPs) cohort, MOUD (N=21) to perform the Stop Signal Reaction Time task. This measure was collected once for controls and twice for MOUD participants, once before and once after a single neuronavigated session of iTBS applied to the l-dlPFC. Error processing in the ACC was hypoactive in the fMRI MOUD participants prior to iTBS, $t(40.6)=2.01$, $p=0.052$, but normalized after a single session of iTBS, $t(56.13)=0.806$, $p=0.424$, relative to the controls. Similarly, error elicited theta power was increased post-iTBS in the ERP MOUD group, $t(20)=2.66$, $p=0.015$. The acute application of iTBS to l-dlPFC normalized ACC error processing in MOUD participants. Both fMRI and ERP measures of ACC error processing were modulated in a MOUD sample, thus highlighting the potential for a safe and effective technique to modulate error processing in MOUD participants as a potential treatment intervention.
Funding: NARSAD, Yale Center for Clinical Investigation

THE CASE FOR DIRECTIONALITY IN BRAIN CONNECTIVITY: ENVIRONMENTAL FACTORS SIMILARLY IMPACTING EXECUTIVE CONTROL ARE DIFFERENTIALLY ASSOCIATED WITH PATTERNS OF CAUSAL BRAIN CONNECTIVITY

Eric Rawls[1-2] , Samantha Darby[3], Bryan Andrews[2], Marvin Yan[4], Jazmin Camchong[3], Malick Abid[5], Michael Kotlyar[6], Erich Kummerfeld5 , D. Bond7
[1]University of North Carolina Wilmington, [2]University of Minnesota Medical School, [3]University of Miami Ohio, [4]University of Minnesota, [5]University of Minnesota, [6]University of Minnesota, [7]Johns Hopkins University

Brain network interactions are characterized as correlations between brain time series derived from fMRI. Few existing methods are capable of inferring causal interactions from rfMRI. Here, we apply methods from Causal Discovery Analysis to tease apart multivariate causal brain interactions. Using a sample of 9-12 year olds from the ABCD study, we explored relationships between environmental factors linked with impaired executive function and causal brain connectivity in previously established addiction networks. Results indicated that both prenatal tobacco exposure and increased isolated screen time were associated with impaired executive function, and with altered connectivity between the Incentive Salience and Executive Control networks. However, the causal model of brain connectivity estimated using the Best Order Score Search (BOSS) algorithm revealed that this effect varied between the two environmental factors. PTE was associated with enhanced connectivity from Incentive Salience network to Executive Control network, while isolated screen time was instead associated with a reduction in connectivity from Executive Control to Incentive Salience network. Increased bottom-up IS connectivity, and reduced top-down Executive Control connectivity, are both implicated in increased susceptibility to developing externalizing psychopathology. Overall, results indicate that the consideration of causality in analyses of brain connectivity can contribute to enhanced understanding of brain pathways associated with development of executive control.

FROM PRECISION PSYCHOPHYSIOLOGY TO PRECISION MEDICINE: HOW MUCH TAILORING IS NEEDED TO TREAT DEPRESSION AND SUICIDE RISK?

Lisa McTeague[1], Jayce Doose[1], Linbi Hong[2], Ruxue Gong[1], XiaoXiao Sun[2], Gavin Doyle[1], Abby Williams[1], Jacob Eade[1], Corbin Ping[1], ChiChi Chang[2], Brendan Murney[1], Sara Hashempour[1], Diego Arias Velasquez[1], Danielle Taylor[3], Noam Schneck[2], Kevin Caulfield[1], Robin Goldman[4], Truman Brown[1], Mark George[1], Paul Sajda[2]
[1]Medical University of South Carolina, [2]Columbia University, [3]Wayne State University, [4]University of Wisconsin-Madison

Depression and suicide risk remain significant public health problems with refractoriness common even in response to the best evidence-based treatments. Using a precision medicine framework to advance promising interventions, in an ongoing trial, we are implementing high dose, accelerated, combinatorial repetitive transcranial magnetic stimulation (rTMS) and cognitive-behavioral therapy (CBT). While CBT is inherently personalized, here rTMS is personalized in multiple psychophysiological domains. Specifically, closed-loop EEG-rTMS is delivered at the individualized optimal alpha phase, determined secondary to the strongest BOLD response to single pulse TMS probes in decoded network masks from emotion regulation and cognitive flexibility tasks completed in a prior session. Further, personally synchronized rTMS is spatially delivered to the individualized location of maximal anticorrelation between left dorsolateral prefrontal cortex and subgenual anterior cingulate cortex derived from resting-state fMRI. To date, 10 individuals have completed treatment and one month follow up with 20 completers planned by October. Per interview and questionnaire measures, all patients began treatment in the severe range of major depression and after only 5 days of treatment no longer met diagnostic criteria. Furthermore, change was rapid with, 88% of participants responding (≥50% reduction) after only three days of treatment and largely maintaining gains to 1 month. Discussion will focus on the advantages as well as challenges and pitfalls of multidomain personalization to advance treatment.
Funding: DARPA

DETERMINING THE OPTIMAL TMS PROTOCOL TO MODULATE THE REWARD POSITIVITY: THE PATH TO THEORETICAL AND CLINICAL PRECISION

Travis Baker
Rutgers University Center for Molecular and Behavioral Neuroscience

The reward positivity (RewP), an ERP sensitive to rewarding feedback during decision-making tasks, has provided empirical insight into individual differences in reinforcement learning, aging, and psychiatric conditions. Yet despite this extensive literature, correlative evidence cannot establish the behavioral significance of brain responses. Transcranial magnetic stimulation (TMS) offers a tool to investigate causal brain-behavior relations and may deepen understanding of the RewP's functional significance in typical and atypical populations. But first, one must know how to modulate this ERP component. In this talk, I present findings from a large TMS parameter search to optimize

targeting and pulse protocols for RewP modulation. Thirty-five nicotine users were assigned to Active (n=17) or Sham (n=18) TMS groups. We individualized targets using structural MRI, fMRI, DWI, and RSFC. Across two sessions, 1000 pulses of 10-Hz TMS were delivered to each of the four targets while EEG was recorded during a reward task. Active TMS increased RewP compared to Sham (p.05). A TMS induced increase in RewP was associated with enhanced reward learning, while reduced RewP was related to decreased effortful control. These findings suggest precise, bidirectional TMS modulation of the RewP and offer best practices to guide future treatments.
Funding: NIDA: UG3DA054787

***Symposium* II-1**

TOWARDS NEW PERSPECTIVES ON BODY-BRAIN DYNAMICS: INNOVATIONS IN MEASUREMENT AND CLINICAL IMPLICATIONS

Chair & Discussant: Giuseppina Porciello; Co-Chair: Vanessa Era
Sapienza University of Rome

Interoception, the sensing of internal bodily states, is essential for maintaining homeostasis, regulating emotions, and guiding adaptive behaviours. It emerges from the dynamic interplay between the brain and the viscera, yet research has often focused on neural, physiological, or psychological mechanisms in isolation. Advances in technology now enable a more integrated approach. This symposium brings together four contributions that investigate brain-body interaction highlighting its relevance for satiety, stress, and emotion processing. The first one examines stomach-brain coupling, showing that stronger post-meal coupling is associated with satiety, identifying it as a potential physiological marker for hunger regulation. The second one employs ingestible sensors to test how stress alters gastric acidity and autonomic balance, providing objective evidence of stress-induced gastric changes. The third one demonstrates that manipulating bodily signals via a heartbeat based vibrotactile stimulation modulates emotional perception, emphasizing the role of somatosensory pathways in emotions. Finally, the fourth one explores vagal afferent signalling, showing that cardiac activity (heart rate variability) precedes and modulates neural responses, with these signals correlating with reports of emotional arousal. Together, these findings highlight the importance of studying body-brain interactions to gain a deeper understanding of their impact on psycho-physiological health, paving the way for novel methods and clinical insights into interoception-related disorders.

PROBING SATIETY FEELINGS THROUGH STOMACH-BRAIN COUPLING

Quentin Moreau[1], Vanessa Era[2], Sofia Ciccarone[2], Arianna Vecchio[2], Maria Serena Panasiti[2], Giuseppina Porciello[2], Salvatore Maria Aglioti[2]
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Although research on the perception of satiety/hunger has extensively investigated hormonal, gut microbiome, and neural-mediated mechanisms, the role of integrated physiological markers combining neural and gastrointestinal activity remains poorly understood. To fill this gap we recruited a sample of 38 healthy volunteers and asked them to report their perceived hunger on a 0-100 visual analog scale both before and after consuming a standardized meal. Moreover, we recorded 15 minutes resting state stomach-brain coupling using electrogastrography (EGG) and electroencephalography (EEG) before and after meal consuming. Stomach-brain coupling was quantified using Phase-Amplitude Coupling (PAC, see Richter et al. 2017). In this context, coupling refers to the phenomenon where the phase of a slower oscillatory signal (EGG) aligns with or correlates with the amplitude of a faster oscillatory signal (EEG). Our results suggest that before the meal, PAC strength was not significantly associated with perceived hunger. However, after the meal, individuals who reported lower hunger levels (i.e., greater satiety) exhibited stronger PAC. These findings suggest that stomach-brain coupling may act as a physiological marker of postprandial satiety, providing insight into the neural and gastrointestinal mechanisms that regulate hunger perception. Furthermore, they highlight the importance of investigating gut-brain interactions in individuals with obesity, where satiety mechanisms may be impaired, potentially offering novel insights for therapeutic interventions.
FUNDING: ERC-2023-Proof Of Concept “DeepDive” Grant to SMA

INGESTIBLE PILLS REVEAL INCREASED SYMPATHETIC CONTROL OVER GASTRIC ACTIVITY DURING VIRTUAL REALITY-INDUCED STRESS

Vanessa Era[1], Giuseppina Porciello[1], Arianna Vecchio[1], Sofia Ciccarone[1], Quentin Moreau[1], Maria Serena Panasiti[2], Salvatore Maria Aglioti[3]
[1]Sapienza University of Rome, [2]Institut des Sciences Cognitives Marc Jeannerod, Lyon, [3]Sapienza University of Rome and CLN2S, Istituto Italiano di Tecnologia (IIT), Rome, Italy

Stressful situations trigger a cascade of psychophysiological responses across multiple systems, including the hypothalamic-pituitary-adrenal axis, autonomic nervous system, and enteric nervous system. Repeated exposure to stress negatively impacts both physical and mental health. Although stress is commonly associated with intense gastrointestinal (GI) sensations, objective evidence of its effects has been limited by indirect and invasive measurement techniques. A promising solution comes in the form of ingestible pills (IP), which offer a non-invasive and minimally intrusive means of obtaining direct indices of GI physiology. In the present study, we used sensors-equipped biocompatible capsules that allowed us to evaluate pH, pressure, and temperature along the GI tract in a group of healthy individuals (N = 36) exposed to a set of validated, psycho-socially stressful, highly immersive virtual reality scenarios. Results showed that higher perceived stress was associated with a less acidic gastric environment, heightened gastrointestinal sensations, increased heart rate, and reduced heart rate variability, indicating enhanced sympathetic control over both cardiac and gastric activity. This innovative approach holds great potential

for advancing our understanding of stress-related responses and providing deeper insights into conditions linked to both stress and gastrointestinal disorders, such as anxiety, depression, and functional gastrointestinal disorders, paving the way for more effective diagnostic and therapeutic strategies.
FUNDING: MUR FIS 2 InterAct to VE ERC-2023-Proof Of Concept "DeepDive" Grant to SMA

PULSES TO SKIN CHANGE THE LOOK OF OTHERS: EMERGENT SOMATOVISCERAL NEURAL REPRESENTATIONS SUPPORT THE EMBODIMENT OF QUASI-INTEROCEPTIVE STIMULATION TO INFLUENCE EMOTIONAL JUDGMENTS

Hugo Critchley[1], Joel Patchitt[1], Will Strawson[2], Mark Miller[3], Manos Tsakiris[4], Sarah Garfinkel[5], Andy Clark[2]
[1]Brighton and Sussex Medical School, [2]University of Sussex, [3]Monash University, [4]Royal Holloway, University of London, [5]University College London

Quasi-interoceptive pathways, e.g. via somatosensory routes, provide an alternative to viscerosensory signalling of the changing physiological state of the body. Typically, somatosensory signalling has greater perceptual (conscious) access and spatiotemporal precision, yet the correspondence and predictive relationship between quasi- and veridical interoceptive information is a potential source of mismatch, error signalling and misattribution. Empirical characterisation of this relationship is relevant to understanding emotional feelings, affective symptoms and psychosomatic pathology. Grounded on prior work on interoception and biofeedback, and referring directly to a recent behavioural and neuroimaging study (Patchitt et al. preprint; https://doi.org/10.21203/rs.3.rs-4748974/v1), the influence of pulsatile 'heartbeat like' vibrotactile stimulation on emotional judgements of other is described. False physiological feedback (faster or slower than the participants' heart rate) respectively enhanced or attenuated valenced intensity ratings of face stimuli. Importantly, these effects increased with increasing duration of somatosensory stimulation, consistent with progressive embodiment. Concurrent functional neuroimaging highlighted insular, parietal and premotor substrates for representation of quasi-interoceptive stimulation. Activity within specific subregions of insular, somatosensory and parietal cortices predicted time-dependent effects on affective ratings. The findings are appraised in relation to interoceptive prediction and the embodiment of (social) emotions.
FUNDING: The neuroimaging study was supported by an European Research Council Advanced Grant to Andy Clark; XSPECT Expecting Ourselves: Embodied Prediction and the Construction of Conscious Experience

BIDIRECTIONAL COMMUNICATION BETWEEN THE HEART AND THE BRAIN: IMPORTANCE OF VAGAL AFFERENTS

Julian Thayer
University of California-Irvine

The intimate connection between the brain and the heart via the vagus nerve was enunciated by Claude Bernard over 150 years ago. Darwin in his classic book on the expression of emotion in man and animals also stressed the importance of the vagus nerve. In our neurovisceral integration model we have tried to build on this pioneering work and revive interest in the vagus. One question that has lingered concerns the role of vagal afferent signals in this bidirectional communication. Specifically, do signals from the heart modulate brain activity or vice versa? In a series of studies we have measured cardiac activity via heart rate variability (HRV) and brain activity via electroencephalography (EEG) and applied time varying time series analysis to investigate the causal relationship between the two signals. In the first study, publicly available data during the viewing of emotional films was used. The results suggested that arousal signals from the heart preceded neural activity and served to instigate and maintain emotional responses. In the second study, HRV and EEG data were collected from 37 healthy adults during a resting condition. The results of this study replicated and extended the first results and showed stronger heart to brain effects compared to brain to heart effects. These studies suggest that vagal afferent signals as indexed by HRV modulate neural activity. Moreover, these signals were associated with reports of arousal rather than valence or attention. Implications of these results for our understanding of interoception will be discussed.

***Symposium* II-2**

BEYOND AVERAGES: TRIAL-BY-TRIAL APPROACHES TO NEURAL AND BEHAVIORAL DYNAMICS

Chair: Peter Clayson
University of South Florida

Understanding how neural and behavioral processes unfold on a trial-by-trial basis can reveal novel insights into dynamic changes in cognitive and affective processing. This symposium features presentations that capitalize on advanced analytic approaches to study these dynamic changes. Bohyun Park et al. described performance monitoring in psychotic disorders, showing that even with overall blunted ERPs in psychosis, trial-by-trial ERP fluctuations predicted within-person behavioral adjustments—highlighting intact aspects of performance monitoring. Ty Lees et al. examined reward learning in humans and rodents, demonstrating trial-level effects can identify unique and shared neural markers of reward processing that are obscured when using averages. Pan Liu et al. showed how applying trial-level EEG and ERP methods can predict memory and socioemotional functioning in adolescence. Christopher Stolz et al. investigated how reward positivity (RewP) tracks avoidance learning under imminent versus distant threats, finding that the RewP is sensitive to successful avoidance in both conditions. Finally, Danielle Jones et al. introduced a novel metric—trial response consistency (tRC)—for assessing within-person variability of neural responses, showing that tRC accounts for unique variance in behavioral performance beyond raw ERP amplitude. Taken together, these talks demonstrate how dynamic approaches at the within-person level can be leveraged to understand cognitive

and affective processes across clinical populations, developmental stages, and species.

BEYOND BLUNTED ERPS: PRESERVED TRIAL-BY-TRIAL ERP-BEHAVIOR RELATIONSHIPS IN PSYCHOSIS

Bohyun Park[1], Amanda Holbrook[1], Philippe Rast[2], Gregory Light[3], Daniel Foti[4], Roman Kotov[5], Peter Clayson[1]
[1]University of South Florida, [2]University of California, Davis, [3]VISN 22 Mental Illness Research, Education, & Clinical Center (MIRECC), San Diego VA Healthcare System, [4]Purdue University, [5]Stony Brook University

Performance monitoring is critical for evaluating and adjusting behaviors to achieve goals. Event-related potential (ERP) performance-monitoring indices, such as error-related negativity (ERN) and error positivity (Pe), predict post-error behavioral adjustment in healthy participants, but this relationship appears weaker in psychotic disorders. The weaker relationship in psychosis contrasts with findings of intact post-error slowing. A possible explanation is the focus on between-person differences in average scores rather than trial-by-trial adjustments (i.e., within-person changes). This study examined whether within-person changes in ERN and Pe predict behavioral adjustments in psychotic disorders. We hypothesized that patients would show weaker ERP-behavior relationships than healthy participants. ERPs and response times (RTs) were recorded from 71 patients with psychosis and 81 healthy participants during a flanker task. Multilevel location-scale modeling predicted RTs from ERP scores and diagnosis. Results showed similar ERP-RT patterns across groups. Larger ERN predicted longer, more variable RTs on subsequent trials at both between- and within-subject levels. Larger Pe predicted shorter, less variable RTs at the between-person level but not within-person. Despite overall blunted ERN and Pe in psychosis, trial-by-trial ERP adjustments predicted within-person RT changes, suggesting a core aspect of performance monitoring remains intact. These findings highlight a promising avenue for understanding dynamic changes: within-person trial-level adjustments.

REWARD LEARNING – A TRIAL-LEVEL APPROACH TO UNDERSTANDING AND LINKING BEHAVIORIAL AND NEURAL RESPONSES IN BOTH HUMANS AND RATS

Ty Lees[1], Samuel Barnes[2], Andre Der-Avakian[2], Samantha Linton[1], Ann Iturra-Mena[3], Brian Kangas[1], Genevieve Nowicki[4], Rachel Lobien[4], [4]Gordana Vitaliano[1], Jack Bergman[1], William Carlezon Jr.[1], Diego Pizzagalli[5]
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Reward learning, a noted transdiagnostic construct of interest for psychopathology, encapsulates a repeated process of evaluating expectations and updating behavior to maximize positive outcomes and is a key target for translational research. Cross-species measurement can help translate between preclinical models and humans and has increasingly made use of EEG. However, despite the updating nature of reward learning, such research has largely used averaged EEG approaches that summarize over multiple trials and may obscure more nuanced effects. To that end, alongside a typical ERP analysis, we examined trial-level EEG and behavioral data from 25 healthy adults (14 female; 27.40 $\pm$5.60 years) who each completed a probabilistic reversal learning task. Task behavior was quantified using RT and accuracy and estimated using a reinforcement Q-learning model. Analogous data from 22 Long-Evans rats (14 males, 226–250g; 8 females, 176–200g) were also analyzed as part of a cross-species translational effort. Analyses revealed that both species demonstrate good performance on the task and similar reward-related neural responses. Linear models using averaged task data find relationships between ERP amplitude and the beta (i.e., explore/exploit; β=-0.13, p=.08) and forget parameters in humans (β=-1.06, p=.005) but not rodents; trial-level models describe the relationships among ERPs, prediction errors, and reward/Q values in both species. Results suggest that some reward-related processes are conserved across species, however, their behavioral underpinnings and implications may differ.
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UNDERSTANDING THE BRAIN-BEHAVIOR RELATIONSHIPS IN SELF-REFERENTIAL PROCESSING: INSIGHTS FROM TRIAL-LEVEL ERP ANALYSIS AND NEURAL OSCILLATION DATA IN EARLY ADOLESCENTS

Pan Liu, Jaron Xe Yung Tan, Tamari Shalamberidze, Jeremy Caplan
University of Alberta

Information that describes oneself (self-referential information) is uniquely salient and preferentially processed even in children. Self-referential processing predicts various socioemotional outcomes across development. In addition to behavioral indicators, researchers have applied EEG/ERP measures to tap into the neural substrates of self-referential processing. However, it remains unclear how these neural and behavioral indicators are linked to each other, hindering our mechanistic understanding of these processes. I will present two lines of research that employed novel methods to explore brain-behavior linkages in self-referential processing in early adolescence, a critical developmental period for self-related constructs. The first line applied a trial-level analytic approach to the ERP data to isolate the between- and within-person variability of the neural substrates of self-referential processing. We found that the within-person variability of the ERPs showed meaningful links with youths' behavioral performance and their psychopathological symptoms. In the second line of work, we conducted oscillatory analysis of EEG data collected during self-referential processing. We found that frontal midline alpha- and beta-band oscillations were associated with youths' memory of self-referential words. Using methodologies beyond conventional ERP analysis, we provide novel data on the brain-behavior relationships in self-referential processing in early adolescents, adding important evidence to the mechanistic knowledge of these processes during development.

FUNDING: National Institute of General Medical Sciences Centers of Biomedical Research Excellence (P20 GM103505) pilot grant

THE REWARD POSITIVITY MAY ALSO REPRESENT A THREAT-RELATED RELIEF POSITIVITY: ELECTROCORTICAL FEEDBACK AND PREDICTION ERROR PROCESSING IN THREAT AVOIDANCE LEARNING WITH IMMINENT VERSUS DISTANT THREAT

Christopher Stolz, Markus Ullsperger
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Threat avoidance learning demands affective control, particularly when threat is imminent vs. distant, and when threat encounters turn out worse (negative prediction error, PE-) or better than expected (positive prediction error, PE+). While PE+ has been widely linked to the Reward Positivity (Rew-P) in monetary reward learning, it remains unclear whether the Rew-P also indexes a threat PE and if it is modulated by differences in threat imminence. To address this, we measured electrocortical positive and negative feedback processing in two reversal learning tasks: one where negative feedback signalled immediate threat (one loud noise burst) and one where negative feedback indicated delayed threat (accumulated noise bursts). The color of the inter-trial fixation cross informed how close participants were to the end of a learning block. We found that Rew-P was amplified in response to positive feedback in the immediate threat vs. delayed threat task, and positively scaled with model-free PE+ in both tasks. However, there was no evidence that feedback and PE+ processing were influenced by the distance to the block's end, i.e., exiting the encounter in the immediate threat task or entering the encounter in the delayed threat task. Our results provide first evidence supporting the Rew-P as being sensitive to successful avoidance of imminent vs. distant threats. Moreover, the Rew-P was a stable index of implicit PE+, may it be in scenarios involving reactive fear or encounter anxiety, potentially framing the Rew-P also as a relief positivity (Rel-P) in threat avoidance learning.
FUNDING: This work was supported by the European Research Council, Grant/Award Number: 101018805

THE PREDICTED RESIDUAL METHOD FOR CALCULATING TRIAL RESPONSE CONSISTENCY (TRC): A WITHIN-SUBJECT ESTIMATE OF DYNAMIC TRIAL-TO-TRIAL VARIABILITY

Danielle Jones[1], Chris Martin[1], Christopher Patrick[1], Keanan Joyner[2]
[1]Florida State University, [2]University of California, Berkeley

Researchers are increasingly interested in response variability, above and beyond measures of central tendency, for neural and behavioral metrics. Variability in fMRI, EEG, and behavioral performance has been established as developmentally and clinically relevant, making response variability potentially important to many subfields of psychology. Concurrently, interest in single-trial approaches to modeling neural and behavioral data has grown as statistical software capable of handling these more advanced methods have become more accessible. A major benefit to this approach is the ability to partition between-subject and within-subject effects simultaneously. Currently, there is no established method to examine response variability trial-to-trial within-subject, as calculating variability necessarily requires aggregation across multiple observations. The current work introduces an innovative new approach to overcome this issue. The predicted residual method for calculating trial response consistency (tRC) is a method that allows researchers to estimate the variability at the trial-level within a single subject. In two independent samples (Sample 1: $N = 182$; Sample 2: $N = 123$), real data from an Eriksen flanker task was used to show that the tRC of the P300 brain response predicts behavioral performance beyond the raw amplitude (Sample 1: $b = 0.08$, $SE = 0.02$, $z = 3.17$, $p = .002$; Sample 2: $b = 0.07$, $SE = 0.03$, $z = 2.87$, $p = .004$), providing preliminary evidence of its utility. Additional analyses demonstrating the value of the tRC metric will be presented.

***Symposium* II-3**

INFANT ELECTROPHYSIOLOGY: METHODOLOGICAL ADVANCES TOWARDS DEFINING EARLY COGNITIVE DEVELOPMENT

Chair: Anna-Lena Tebbe
University of Florida

The first years of life mark a period of extensive brain maturation and cognitive development. Yet, mechanisms underlying perception and learning dynamics in infancy are not well understood. In recent years, novel methods have emerged as promising tools to address limitations in studying human cognitive development. These include tools that measure (rhythmic) brain activity with high signal-to-noise ratio. The present symposium brings together distinct applications to showcase the value of using EEG in characterizing infant development. The first presentation will provide an overview of the field, discussing how EEG measurements may be tailored to infants, emphasizing the important role of multi laboratory studies in defining early cognitive abilities. The second talk will present a study demonstrating how infants use associative learning mechanisms to form representations of their environment, characterizing the trajectories of learning-related visuocortical changes. The third talk will examine how the perspective of others shapes visual representation of the environment. It then shows how others' visual perspective modulates infants' own neural processing of objects. The final talk illustrates how naturalistic social contexts and conventions influence brain rhythms and behavior, emphasizing the sensitivity of very young infants to social interactions. Taken together, these presentations highlight the potential of sophisticated electrophysiological methods for testing and advancing theories of human early development.

SCALING EEG-BASED MEASUREMENT OF INFANTS' NEURODEVELOPMENT: CHALLENGES AND LESSONS LEARNED

Santiago Morales[1], Kira Ashton[2], Dylan Gilbreath[2], Whitney Kasenetz[2], Trisha Maheshwari[2], Savannah McNair[2], Marco McSweeney[2], Jessica Norris[2], Sarvenaz Oloomi[1], Koraly Pérez-Edgar[3], Nathan Fox[2]
[1]University of Southern California, [2]University of Maryland, [3]The Pennsylvania State University

EEG studies, especially with infants, have relied on relatively small samples, posing a challenge to the replicability and generalizability of the existing literature. This is in part because infants present unique challenges to the scalability of EEG studies due to shorter recordings and increased artifacts. As infant EEG, as a field, strives towards larger and more representative samples, there is an increasing need for large-scale collaborations, as well as the development of standardized tools and methods. Our presentation will discuss ongoing efforts in scaling the measurement of EEG in infants. We will discuss our work and overall organization of the HEALthy Brain and Child Development (HBCD) Study EEG Workgroup and protocol, which plans to measure EEG on approximately 7,500 infants, assessed twice in infancy across 27 recruitment sites. We will present descriptive data from the first public data release, illustrating the main measures capturing several cognitive processes, including visual processing, face processing, language development, and resting state. Our discussion will focus on the challenges encountered by large-scale collaborations and the methodological advances to overcome them. Finally, we will highlight the opportunities that large-scale collaborations offer for advancing our understanding of infants' neurodevelopment, while promoting the use of publicly available datasets like the HBCD study.
FUNDING: The HBCD Study is supported by the National Institutes of Health and additional federal partners under award numbers U01DA055352, U01DA055353, U01DA055366, U01DA055365, U01DA055362, U01DA055342, U01DA055360, U01DA055350, U01DA055338, U01DA055355, U01DA055363, U01DA055349, U01DA055361, U01DA055316, U01DA055344, U01DA055322, U01DA055369, U01DA055358, U01DA055371, U01DA055359, U01DA055354, U01DA055370, U01DA055347, U01DA055357, U01DA055367, U24DA055325, U24DA055330. A full list of supporters is available at https://hbcdstudy.org/about/federal-partners/.

FROM THE BRAINS OF BABES: EVIDENCE OF VISUOCORTICAL COMPETITION, SHARPENING AND GENERALIZATION

Lisa Scott, Maeve Boylan, Anna-Lena Tebbe, Jessica Figueira, Valeria Burgos-Villanueva, Alexia Brown, Andreas Keil
University of Florida

Infants use domain- and task-relevant associative learning mechanisms to form representations of an increasingly complex world. To characterize this process parent-infant dyads were examined cross-sectionally at 6, 9, and 12 months of age after they read a short book together. The book included novel objects labeled with individual names, category labels, or no labels. Infants and parents returned the next day and participated in an EEG frequency tagging task. Parent-infant dyads viewed book-trained and untrained objects concurrently and spatially overlapping at distinct frequencies (i.e., 5 Hz, 6 Hz) to evoke steady-state visual evoked potentials (ssVEPs). The untrained objects varied in similarity (high, medium, low) from the trained objects. Competition between trained and untrained objects, recorded over the visual cortex, differed by age, such that responses to trained stimuli increased while responses to untrained stimuli decreased with age. By 9 months, visuocortical responses favored trained objects. To investigate visuocortical sharpening or generalization effects, neural responses to trained stimuli were compared to the untrained object by similarity. Bayesian linear models demonstrated that when viewing Individual-label stimuli, neural sharpening was well supported over the null model and over a model of neural generalization. Category-labeled stimuli, on the other hand, prompted more support for a model of generalization across similarity levels. Findings highlight trajectories of visuocortical change and delineate how this change supports learning.
FUNDING: National Institute of Child Health and Human Development (NICHD) (1R21HD102715-01) Scott, L.S. (PI), Keil, A. (PI); Title: Parent-infant learning dynamics during early shared book reading.

ALTERCENTRIC MODULATION OF NEURAL OBJECT PROCESSING IN INFANTS AND ADULTS

Anna-Lena Tebbe[1], Katrin Rothmaler[2], Moritz Köster[3], Charlotte Grosse Wiesmann[4]
[1]University of Florida, [2]University of Leipzig, [3]University of Regensburg, [4]University of Technology Nuremberg

Already in their first year of life, infants seem to consider others' perspective, even when it differs from their own. Similarly, adults are able to take the perspective of others effortlessly in parallel to other cognitively demanding tasks. This prompts the question of how multiple perspectives are processed efficiently, despite infants' limited cognitive capacities. To test whether and how others' perspectives are neurally represented, we flickered objects in a 4Hz rhythm, which evoked neural oscillations at the same frequency (steady-state visual evoked potentials, SSVEP). Infant and adult participants were presented with an agent observing a flickering object that either disappeared into a tunnel (blocking both the participants' and the agent's view) or behind an occluder (blocking only the participants' view). We hypothesized that both infants (aged 12-14 months) and adults will not only show SSVEP responses if they themselves see the flickering object, but show prolonged oscillations in response to someone else seeing the object, even after this object was no longer visible to themselves. Indeed, both infants (N=56) and adults (N=40) showed a higher response amplitude when the agent continued to see the object (occluder condition) compared to when she could no longer see it (tunnel condition). These findings suggest that infants' and adults' process what others see similar to their own perception, revealing a neural mechanism for efficient perspective taking that might be present from infancy.

INFANTS ACT IN LINE WITH SOCIAL CONVENTIONS –NEURAL, BEHAVIORAL AND EMOTIONAL FINDINGS IN LIVE SOCIAL SITUATIONS

Louisa Kulke, Sahura Ertugrul
University of Bremen

Social context significantly affects behavior: Adults avoid looking at strangers in live social situations but readily look at videos of the same stranger. Neural responses suggest comparable attention to strangers even if they do not look at them, suggesting that the lack of gaze is due to social norms rather than disinterest. The current preregistered (osf.io/k69hf) study hypothesized that infants also react differently to live and video strangers. Infants between 3-6 months were seated in a waiting room while their neural responses (alpha power) were measured using EEG, and their gaze and emotional expressions were recorded via webcam. A confederate, present live or as video, first looked neutral while filling out a questionnaire, then smiled while looking at the questionnaire and finally interacted with the infant. Infants avoided looking at the live stranger when she looked neutral, as they looked longer at the video of the neutral stranger than at the live stranger. EEG alpha power as a measure of attentiveness confirmed that infants were attentive but inhibited their gaze if appropriate. Interestingly, they looked significantly more at the live stranger when she started to interact with them. They furthermore smiled more at the confederate interacting with them in the live condition but significantly less in the video condition. The findings suggest that infants show emotional interactions with people who are present in person but not to videos of people. This suggests that very young infants already recognize when another person can and wants to interact with them.

***Symposium* II-4**

BRIDGING MINDS AND TECHNOLOGY: ADVANCEMENTS IN USING BRAIN-BASED METHODS TO BETTER UNDERSTAND AND TREAT DEPRESSIVE DISORDERS

Chair: Alainna Wen[1]; Co-Chair:
Benjamin Rosenberg[2];,Discussant: Diego Pizzagalli[3]
University of California, Los Angeles[1], Pomona College[2], University of California, Irvine[3]

Depressive disorders are prevalent and debilitating. Despite the existence of evidence-based interventions, rates of non-recovery and recurrence remain high, highlighting the need for innovations in conceptualization and treatment. Dysfunctions in brain networks and associated neurocognitive deficits are strongly implicated in depression risk and are the focus of treatments involving brain stimulation. This symposium leverages innovative brain-based techniques involving neuroimaging, neuropsychological tasks, and brain stimulation to elucidate mechanisms that a) increase risk for depressive disorders, or b) enhance treatment response. First, Alainna Wen (University of California, Los Angeles) will delineate the association between brain network connectivity and broad symptom dimensions underlying depressive disorders. Next, Leanne Quigley (Yeshiva University), will present findings on executive function deficits in individuals with current and remitted depression. Third, Helmet Karim (University of Pittsburgh) will illustrate how brain stimulation alters neurophysiology during reward processing, highlighting implications for the treatment of anhedonia symptoms. Lastly, Benjamin Rosenberg (University of California, Los Angeles) will highlight the role of coach-supported digital mental health in augmenting the effects of standard-of-care brain stimulation for major depressive disorder. Diego Pizzagalli (University of California, Irvine) will serve as discussant, integrating and synthesizing the presentations as well as highlighting key future research areas.

UNRAVELING BRAIN NETWORK CONNECTIVITY PATTERNS UNDERLYING DEPRESSIVE AND ANXIETY DISORDERS TRANSDIAGNOSTICALLY

Alainna Wen[1], Kaylee Null[1], Cody Cushing[1], Richard Zinbarg[2], Robin Nusslock[2], Michelle Craske[1]
[1]University of California, Los Angeles, [2]Northwestern University

Deficits in affective experiences are hallmark risk factors for depressive disorders and comorbid disorders such as anxiety. These maladaptive affective processes have been linked to dysfunctions within brain networks, including the salience, central executive, and the default mode network. Research on network connectivity in depressive and comorbid disorders has historically used a categorical diagnostic approach. However, dimensional approaches have been shown to better account for within-disorder heterogeneity and between-disorder comorbidity. The current study examined the link between network connectivity that underlies affective experiences and transdiagnostic symptom dimensions using the Tri-Level Model of Depression and Anxiety. Young adults participated in a 4-year longitudinal study, where they completed functional magnetic resonance imaging scans and self-report symptom questionnaires. Multilevel models were conducted to examine the associations between resting-state canonical network connectivity and transdiagnostic symptom dimensions. Results showed that resting-state connectivity in the default mode network predicted the trajectory of the broad General Distress symptom factor but not intermediate symptom factors (i.e., Anhedonia-Apprehension, Fears). These findings suggest that default mode network connectivity may confer risk for negative affectivity that spans depressive and anxiety disorders. Clinical implications and future directions will be discussed.

INVESTIGATING HOT AND COLD EXECUTIVE FUNCTIONING IN ACTIVE AND REMITTED DEPRESSION

Leanne Quigley[1], Stephen Perkovic[2], Lena Quilty[3]
[1]Ferkauf Graduate School of Psychology, Yeshiva University, [2]York University, [3]Centre for Addiction and Mental Health; University of Toronto

Executive functioning deficits are a transdiagnostic risk factor for psychopathology, and impaired cognitive control in emotional contexts specifically is emphasized in cognitive models

of depression. Prior research suggests impaired executive functioning in both "cold" (i.e., non-emotional) and "hot" (i.e., emotional) contexts in depression, but there is a lack of research directly comparing hot and cold contexts. We assessed hot and cold executive functioning in currently (CD; n = 83), remitted (RD; n = 90), and never depressed (ND; n = 80) adults using a neuropsychological test battery and two cognitive control (inhibition, working memory updating) tasks. For the latter tasks, we varied the cold vs. hot context in two ways: 1) the use of neutral vs. emotional stimuli; and 2) completion of the tasks in a neutral vs. negative mood condition. Overall, CD and RD participants performed similarly on the neuropsychological tests to ND participants, except for impairments on two of the tests involving processing speed and working memory updating among CD participants. No differences between CD, RD, and ND participants were observed in either cold or hot inhibition. All groups had poorer working memory updating when processing emotional vs. neutral stimuli, but this discrepancy was largest among RD participants. Our findings provide limited evidence for hot or cold executive functioning deficits in depression. A limitation of this study is that data were collected remotely, which may have introduced random error. Replication in a study with greater experimental control is needed.
FUNDING: Canadian Institutes of Health Research

DOES MENTAL HEALTH COACHING IMPROVE EFFICACY OF TRANSCRANIAL MAGNETIC STIMULATION FOR MAJOR DEPRESSION? EVIDENCE FROM A CLINICAL BENCHMARKING STUDY

Benjamin Rosenberg[1], Nora Barnes-Horowitz[2], Doan Ngo[2], Jung Park[3], Ossanna Amran[4], Aleeza West[2], Jiani Li[5], Chiana Yang[6], Kelly Cai[7], Anastassia Costello[2], Ekin Kiyici[8], Isabelle Lanser[2], Cole Matthews[2], Thomas Valles[2], Andrew Leuchter[2], Michelle Craske[2]
[1]Pomona College, [2]UCLA, [3]Brown University, [4]Fuller Theological Seminary, [5]USC, [6]University of Minnesota, [7]Moderna, Inc., [8]Yeshiva University

Major depressive disorder (MDD) is a highly burdensome and costly condition. Despite the demonstrated effectiveness of treatments for MDD, a large proportion of treatment-seeking individuals do not show meaningfully improvements. Repetitive transcranial magnetic stimulation (rTMS) is an effective intervention for use among MDD patients who do not respond to first-line treatments. Coach-supported digital mental health programs may augment rTMS treatments for MDD. This randomized controlled trial compared two coach-supported digital mental health programs (internet-based cognitive behavioral therapy versus supportive videos) during standard-of-care rTMS treatment for MDD at the UCLA TMS Clinical and Research Service. We additionally evaluated if either group, compared to a benchmarking sample receiving rTMS alone, was associated with accelerated symptom reduction on the clinician-rated Hamilton Depression Rating Scale. There were no significant differences in symptom reduction between the study groups. However, completion of either coach-supported program was associated with greater symptom reduction compared with the benchmarking sample (p=.033). Furthermore, the internet-guided cognitive behavioral therapy group was associated with less dropout compared with the supportive coaching group (p=.005). Coach-supported digital mental health programs, and particularly internet-based cognitive behavioral therapy, may enhance the efficacy of rTMS for MDD. Additional research is needed with larger samples and using a waitlist control design.

***Symposium* III-1**

HEART-EVOKED POTENTIALS, INTEROCEPTION, AND THE ROLE OF RESPIRATION

Chair: Marie-Anne Vanderhasselt[1]; Discussant: Hugo Critchley[2]
[1]Ghent University, [2]Brighton and Sussex Medical School

Interoception, the ability to perceive internal bodily processes, plays a crucial role in overall well-being with impairments linked to anxiety disorders and depression. Heart-evoked potentials (HEPs), cortical responses to cardiac activity measured via electroencephalography (EEG), provide a promising measure of interoception. Higher interoceptive awareness correlates with stronger HEP amplitudes, yet findings remain inconsistent, likely due to methodological differences in HEP extraction. Furthermore, recent research suggest that breathing patterns may influence interoceptive processes, with heightened sensitivity to internal bodily states during exhalation compared to inhalation. This symposium will explore the relevance of HEPs as a measure of interoception and examine the potential influence of respiration on interoception and HEPs. Jenny Murphy will provide a general overview of the relationship between HEPs and interoception. Rania Imān will discuss different methodological approaches to extract HEPs from EEG and ECG data, highlighting the impact of various signal processing parameters. Finally, Riet Vergauwe will present her research on the influence of psychosocial stress on HEPs, emphasizing the role of respiration in this process. The session will conclude with a discussion led by Hugo Critchley, who will integrate key insights from the presentations and facilitate a dialogue on future research directions.

EVALUATING THE HEARTBEAT EVOKED POTENTIAL: CHALLENGES, SOLUTIONS, AND FUTURE DIRECTIONS IN INTEROCEPTIVE RESEARCH

Jennifer Murphy
University of Surrey

The heartbeat evoked potential (HEP) is a scalp-recorded event-related potential (ERP), time-locked to participants' heartbeats, that is thought to reflect the cortical processing of cardiac sensations. While the HEP has been proposed as a neurophysiological marker of interoceptive processing, concerns regarding measurement reliability have raised questions about its validity as an indicator of implicit interoceptive processing. In this talk, I will discuss the key challenges associated with HEP measurement, strategies to mitigate these issues, and highlight critical unanswered questions that must be addressed before the HEP can be reliably used as a marker of interoceptive processing.

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METHODOLOGICAL APPROACHES TO DERIVE THE HEARTBEAT-EVOKED POTENTIAL: PAST PRACTICES AND FUTURE RECOMMENDATIONS

Rania-Iman Virjee
University College London

The heartbeat-evoked potential (HEP) is an implicit, electrophysiological marker of cortical heartbeat processing and interoception, with increasing clinical relevance. However, on the scalp, HEP are low-amplitude signals mixed with cardiac field artefacts (CFA), requiring signal processing pipelines to separate HEP from CFA. This review evaluates current analytical approaches, addresses methodological gaps in HEP pipelines, and examines the impact of key parameter choices. HEP processing methods/parameters used in EEG (N=101) and MEG (N=10) studies were investigated, focusing on the effects of HEP window, electrodes, filters, independent component analysis (ICA) and artefact subspace reconstruction (ASR), on HEP extraction, using Temple University's normal scalp EEG data. EEG and MEG studies revealed clear inconsistencies in HEP parameter use and reporting. ASR-20 (ASR threshold for artefact detection) performed comparably to ICA for artefact removal, supporting its potential real-time EEG applicability. Epoch rejection, a HEP quality metric, appeared equivalent between ICA and ASR-20 after artefact removal. Linear Mixed Model analysis identified significant effects of RR interval, maximum epoch amplitude, HEP window and baseline correction start time on measured HEP amplitude. Standardised reporting of critical HEP extraction parameters is essential for improving study comparability, reproducibility and towards establishing a gold standard. Methodological consistency will enhance HEP's reliability as a biomarker and advance its clinical and wearable applications.
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BRAIN-BODY COMMUNICATION IN RESPONSE TO PSYCHOSOCIAL STRESS: THE ROLE OF HEART-EVOKED POTENTIALS AND RESPIRATION

Riet Vergauwe
Ghent University

The communication between the brain and body in response to stress is well-documented, particularly the top-down influence of the brain on the heart, as reflected in stress-induced decreases in heart rate variability (HRV). However, the bottom-up transmission of interoceptive signals from the heart to the brain, specifically through heart-evoked potentials (HEPs), remains less understood. This study investigates the role of HEPs in brain-body communication during psychosocial stress and examines the modulatory effect of respiration. Psychosocial stress was induced using the Montreal Imaging Stress Task (MIST). During this task, participants solved mental arithmetic problems under social-evaluative threat. HEPs were compared before and after the MIST task while accounting for respiratory phase (inhalation vs. exhalation). Respiration plays a crucial role in modulating interoceptive signals, as previous studies have shown that HEP amplitudes are attenuated during inhalation compared to exhalation, likely due to changes in attentional focus and mechanoreceptor activation. By examining the interplay between respiration, HEPs, and stress, this study aims to provide novel insights into brain-body communication under psychosocial stress.

***Symposium* III-2**

UNSEEN STRUGGLES: PSYCHOPHYSIOLOGICAL INSIGHTS INTO DISCRIMINATION AND RISK BIOMARKERS IN MINORIZED GROUPS

Chair: Luca Carnevali[1], Co-Chair: Cristina Ottaviani[2], Discussant: Julian Thayer[3]
University of Parma, Italy[1], Sapienza University of Rome[2], University of California, Irvine[3]

This symposium explores the extent to which discrimination impacts cardiovascular function and psychophysiological adaptation, focusing on heart rate variability (HRV), blood pressure-related parameters, cardiovascular risk, and stress physiology in marginalized groups. The goal is to refine psychophysiological models of minority stress and advance health equity. Dr. Ottaviani presents meta-analytic evidence on the link between discrimination and HRV, reinforcing the paradox of heightened resting HRV in minorized groups. Dr. Carnevali examines racial disparities, showing that Black Americans exhibit higher HRV, lower Total Peripheral Resistance, and higher Blood Pressure with increased lifetime discrimination. Dr. Watanabe explores the mechanisms underlying this "Cardiovascular Conundrum," emphasizing the crucial role of emotion regulation strategies. Dr. Juster extends the discussion to sexually marginalized groups, presenting research on HIV+ transgender women of color and illustrating how discrimination embeds itself biologically. Prof. Thayer will integrate findings, addressing implications for policy and interventions to mitigate discrimination's impact on psychophysiological health.

THE COST OF COPING: META-ANALYTIC EVIDENCE ON DISCRIMINATION AND HEART RATE VARIABILITY

Cristina Ottaviani[1], Giuseppe Salvo[1], Fiorenzo Laghi[1], Gianluca Esposito[2], Julian F. Thayer[3], Roberto Baiocco[1]
[1]Sapienza University of Rome, [2]University of Trento, [3]University of California, Irvine

Chronic coping with discrimination has been linked to increased cardiovascular risk, yet evidence suggests minorized groups exhibit higher resting heart rate variability (HRV), a potential protective factor. This paradox has been attributed to the constant regulation of negative emotions. However, the direct relationship between discrimination and HRV remains unclear. This study presents two meta-analyses examining (1) self-reported

discrimination and tonic HRV and (2) phasic HRV responses to discrimination. A significant positive association emerged between discrimination and resting HRV (k = 21, n = 5,945, g = .22, p = .002), aligning with the so-called cardiovascular conundrum. In contrast, exposure to an experimental discrimination induction was associated with a significant decrease in HRV (k = 8, n = 516, g = -.23, p = .017), suggesting an adaptive threat response. Results were not influenced by publication bias. These findings highlight a critical societal challenge with implications for the health security of minorized groups. Further research is needed to clarify the mechanisms underlying this paradox and its long-term consequences.

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THE ROLE OF DISCRIMINATION IN CARDIOVASCULAR HEALTH: EXTENDING THE CARDIOVASCULAR CONUNDRUM

Grace M. Fishback[1], DeWayne P. Williams[1], Mark N. Jarczok[2], Cristina Ottaviani[3], Luca Carnevali[4], Julian F. Thayer[1]
[1]University of California, Irvine, USA, [2]University Hospital Ulm, Germany, [3]Sapienza University of Rome, Italy, [4]University of Parma, Italy

Prior research demonstrates that Black Americans (BA) display a Cardiovascular Conundrum characterized as increased heart rate variability (HRV) paired with increased total peripheral resistance (TPR) and blood pressure (BP) relative to White Americans (WA). This study aimed at replicating these findings and determining the role of discrimination in this pattern. Data from the Midlife in the United States study (N = 1450: BA = 290; WA = 1160) were utilized in which physiological measures were collected during a 10-minute resting baseline. HRV was indexed using high-frequency HRV. Cardiac output, TPR, and mean arterial BP were calculated via established guidelines. Participants self-reported lifetime discrimination. Adjusting for covariates, BA had significantly higher HF-HRV, TPR, and BP than WA (each $p < .05$), thereby characterizing the Cardiovascular Conundrum. Among BA only, higher discrimination was linked with lower TPR and BP, and no significant associations were found among WA. Taken together, results indicate that discriminatory experiences and race play a significant role in cardiovascular function. These findings have important implications for health given the disproportionate rate of cardiovascular disease seen amongst BA.

RESTING HEART RATE VARIABILITY AND EMOTION REGULATION: MULTI-ETHNIC DIFFERENCES IN REAPPRAISAL AND SUPPRESSION

Darcianne K. Watanabe[1], Alexandra T. Tyra[2], DeWayne P. Williams[1], Annie T. Ginty[2], Julian F. Thayer[1]
[1]University of California, Irvine, [2]Baylor University

Recent work found the relationship between heart-rate variability (HRV), an index of emotion regulation (ER) flexibility, and ER difficulties differs by ethnicity. This study examined whether this relationship exists in other marginalized groups—Blacks and Hispanics—who may experience unfair treatment, an area yet unexplored. We addressed this gap by examining ethnic differences in the relationship between HRV, indexed by log-transformed high-frequency HRV (HF) and ER, indexed by suppression and reappraisal. A total of 1047 had complete data (183 Asian (Mage = 19.7[1.6], 96 women), 82 Black (Mage = 19.8[1.8], 53 women), 228 Hispanic (Mage = 19.7[1.9], 134 women), and 554 non-Hispanic White|NHW individuals (Mage = 19.7[1.7], 334 women)). Blacks had higher HF than all groups (rs > .16) and Asians had lower HF than Hispanics and NHW (rs > .06). NHW had lower suppression than all groups (rs > .06). Adjusting for body habitus and sex, slope differences showed that the negative HF-reappraisal link in Blacks was stronger than the positive link in Asians (rz = .14 [0.02, 0.26], p = .02) and NHW (rz = -.08 [-0.16, 0.00], p = .02). The negative HF-suppression link in NHW was weaker than the positive link in Asians (rz = .05 [-0.03, 0.12], p = .10) and stronger than the positive link in Blacks (rz = .05 [-0.03, 0.13], p = .10). Findings suggest that the physiological underpinnings of ER vary among ethnic groups. For marginalized groups, the situation being reappraised (e.g., discrimination) could be considered in future work.

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STIGMA STRAINS STRESS PHYSIOLOGY OF SEXUAL AND GENDER DIVERSE PEOPLE

Robert-Paul Juster
University of Montreal

Discrimination is a chronic stressor that shapes physiological functioning among sexual and gender diverse (SGD) people. Emerging research has integrated stress biomarkers to examine how stigma and marginalization impact cortisol functioning and allostatic load (AL). Using a selection of international studies, this presentation will demonstrate that sexual orientation and gender identity shape stress physiology, with 'coming out' linked to adaptive cortisol patterns and better mental health. Structural stigma further disrupts stress biomarkers, as seen in altered physiological responses to the Swiss marriage equality referendum and disparities in AL in the United States. Extending this work, we integrate cortisol and AL to examine health inequities among transgender populations and, through NIH-funded collaborations, investigate AL in HIV+ transgender women of color, cardiovascular health, and substance use. These findings refine psychophysiological models of minority stress by revealing how discrimination embeds itself biologically to drive health disparities. These findings advance psychophysiological models of minority stress by elucidating how discrimination 'gets under the skin and skull' to drive health disparities.

FUNDING: CFI; CIHR; FRQS; NIHR01s

RESTING-STATE RENAISSANCE: LEVERAGING RESTING-STATE NEURAL MEASURES TO UNDERSTAND ADOLESCENT INTERNALIZING PSYCHOPATHOLOGY

Chair: Madison Politte-Corn
Pennsylvania State University

The last decade has seen a proliferation of research utilizing task-based neural metrics to predict or characterize internalizing difficulties (e.g., Bechor et al., 2019; Bunford et al., 2018; Kujawa et al., 2015; Smith et al., 2020). In addition to these measures, resting-state neural patterns, such as EEG asymmetry which has a long and robust literature (Davidson, 1998; McManis et al., 2002; Theall-Honey & Schmidt, 2006), as well as newer metrics such as delta-beta coupling or salience network connectivity, continue to provide information about the etiology of internalizing disorders. Moreover, these measures offer the advantages of being (1) more readily available across labs and (2) easier to administer and compare across development relative to task-based measures. But what can resting-state patterns tell us about internalizing problems and intervention targets? This symposium integrates papers leveraging resting-state metrics derived from EEG and fMRI to understand internalizing heterogeneity during adolescence, a developmental period marked by a high risk for the onset and peak of internalizing symptoms (Bitsko et al., 2022). Specifically, these papers focus on (1) differentiating temperamental risk from social anxiety symptoms (2) delineating subtypes of anxiety (3) identifying markers of comorbid internalizing symptoms and (4) predicting risk for depression using resting-state neural measures. Collectively, these studies highlight the utility of resting-state neural data in predicting or characterizing adolescent internalizing psychopathology.

DISENTANGLING THE ROLE OF DIFFERENT RESTING-STATE NEURAL MARKERS OF ADOLESCENT BEHAVIORAL INHIBITION AND SOCIAL ANXIETY

Madison Politte-Corn
Pennsylvania State University

One of the most reliable predictors of social anxiety is the temperamental profile of behavioral inhibition (BI). Resting-state EEG-based neural markers, namely frontal alpha asymmetry and delta-beta coupling (DBC), hold promise for differentiating BI and social anxiety symptoms during adolescence. This study aimed to (1) clarify the relation between these neural markers, BI, and social anxiety and (2) examine the moderating role, individually, of frontal alpha asymmetry and DBC on the BI-social anxiety link. Participants were 97 adolescents aged 13-17 (84.4% White, 54.6% female) and their parents. Parents reported on adolescent BI and adolescents self-reported social anxiety symptoms. Additionally, adolescents provided EEG data across a 6-minute resting task. Stronger DBC was directly associated with higher social anxiety symptoms ($r = .29$, $p = .005$), but not BI ($r = .08$, $p = .420$). Further, DBC did not interact with BI to predict social anxiety symptoms either as a total score or for any subscale (p's > .411). In contrast, frontal alpha asymmetry was not directly associated with either BI or social anxiety (p's > .18) but interacted with BI to predict avoidance and distress to social situations [$b = -0.08$, $SE = 0.04$, $\Delta R2 = .04$, $F(1, 93) = 4.50$, $p = .037$], such that greater relative right activation predicted a stronger BI-social anxiety link. Findings suggest that high DBC may mark a general vulnerability for social anxiety symptoms, whereas frontal alpha asymmetry may potentiate the risk for social anxiety symptoms among BI youth.

FUNDING: This research was supported by the National Institute for Health, Grant R01 MH114974 and Grant MH114974S1.

SALIENCE-REWARD NETWORK COUPLING IS ASSOCIATED WITH DEPRESSION AND ANHEDONIA IN SOCIALLY ANXIOUS ADOLESCENTS

Corinne Carlton-Smith[1], Ligia Antezana[2], Sarah Woronko[1], John Richey[3]
[1]Vanderbilt University, [2]University of Pittsburgh School of Medicine, [3]Virginia Tech

Socially anxious teens tend to experience co-occurring internalizing symptoms, such as depression and anhedonia, yet the neural mechanisms underpinning these associations remain poorly understood. Two neural networks that have been implicated in internalizing and anhedonic symptoms are the salience network and the reward network. The present study assesses the how these neural couplings relate to depression and anhedonia in socially anxious teens. N=30 socially anxious teens between 13 -17 years old (Mage = 15.31; SD = 1.51; 55.2% cisgender girls) completed a magnetic resonance imaging scan and self-report questionnaires. Resting-state neuroimaging data was pre-processed using tools from FSL. A seed-based connectivity approach was used with ROIs defined using the Harvard Oxford atlas. ROIs of interest included the insula, dACC, NaCC, vmPFC, and OFC. Significant coupling between the insula and NaCC emerged. Weaker coupling of the insula and NaCC significantly correlated with increased self-reported depression ($r = -.44$, $p < .05$) and anhedonia ($r = -.39$, $p < .05$). Additionally, stronger coupling between NaCC and VmPFC were linked to decreased anticipatory pleasure ($r = -.45$, $p < .05$), and stronger coupling between the NaCC and OFC was significantly associated with decreased consummatory pleasure ($r = -.46$, $p < .05$). Results suggest a potential connectivity overdrive within the reward network that relates to anhedonia in socially anxious teens, as well as a disconnection in the ability to internally detect and process that may further translate to depressive symptoms.

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REDUCED CONTROL NETWORK CONNECTIVITY AS A MECHANISM IMPLICATED IN THE INTERGENERATIONAL TRANSMISSION OF DEPRESSION

Eda Naz Dinc[1], Matthew Thompson[2], Noah Chuck Kingston[3], Cope Feurer[4], K. Luan Phan[2], Scott A. Langenecker[2], Katie L. Burkhouse[1]
[1] Pennsylvania State University, [2]Ohio State University, [3]Nationwide Children's Hospital, [4]University of North Carolina

Daughters of depressed mothers face a higher risk (HR) for developing chronic MDD compared to low risk (LR) youth. Identifying reliable brain mechanisms of risk is crucial for early detection and prevention. Altered functional connectivity in brain networks supporting emotion processing, particularly reduced connectivity within the cognitive control network, has been implicated in depression risk. This study examined whether reduced CCN connectivity 1) differentiated depressed mothers from healthy controls and HR from LR daughters, and 2) predicted depressive symptoms in daughters. 56 mother-daughter dyads (M mothers=44.36; M children=13.52) completed an 8-minute resting state fMRI scan. 25 mothers had a history of recurrent MDD. Daughters were lifetime free of MDD at baseline. Depressive symptoms were assessed at baseline, 6, 12, 18 months. Mothers with a history of MDD exhibited reduced connectivity between the CCN and the middle frontal gyrus (Z=3.81), dorsal anterior cingulate cortex (dACC) (Z=3.08), and insula (Z=4.38). HR youth showed reduced connectivity between the CCN and dACC (Z=3.87) and middle frontal gyrus (Z=3.35), but increased connectivity between the CCN and parietal and temporal regions (Z-range, 3.42-4.51). All p's = .005. Across daughters, reduced connectivity between the CCN and dACC (t = -1.89, p = .045) predicted increases in depressive symptoms across the follow-ups. Findings suggest that reduced connectivity between the CCN and dACC may be one brain-based biological marker implicated in the intergenerational transmission of depression.
FUNDING: National Institute of Mental Health K23 MH113793

***Symposium* III-4**

PSYCHOPHYSIOLOGICAL INVESTIGATION OF MECHANISMS OF HARMFUL SUBSTANCE USE

Chair: Christopher Patrick[1]; Discussant: Robert Krueger[2]
[1]Florida State University, [2]University of Minnesota

Substance use disorders (SUDs) are a major societal problem and a topic of longstanding interest to psychophysiologists. This symposium focuses on neurophysiological mechanisms relevant to SUDs. Bruce Bartholow will present findings from a multimethod longitudinal investigation of factors contributing to harmful alcohol use, focusing mainly on alcohol cue-reactivity (ACR-P3; approach-avoidance conflict N450) as a marker of incentive salience sensitization among drinkers low in alcohol sensitivity. Complementing this, Alex Kallen will report findings from an alcoholic/nonalcoholic beverage-cue ERP study examining how individual variations in alcohol sensitivity relate to alcohol cue-reactivity (ACR-P3), and the extent to which trait disinhibition and alcohol use severity moderate this relationship. Using longitudinal data from the European IMAGEN project, Keanan Joyner will report on the combined roles of trait disinhibition and low reward sensitivity (indexed by MID-task NAcc activation) in SUDs more broadly. With reference to the HiTOP psychopathology model, Chris Patrick will discuss how low reward sensitivity (indexed by Doors-task RewP) operates to direct general externalizing liability toward SUD versus antagonistic-aggressive symptom expressions. As discussant, Robert Krueger will highlight implications of these various findings for our understanding of SUDs and their potential utility for risk prediction/prevention and treatment.

LOW ALCOHOL SENSITIVITY AS A PHENOTYPIC MARKER OF INCENTIVE SALIENCE SUSCEPTIBILITY IN HUMANS

Bruce Bartholow[1], Roberto Cofresi[2]
[1]University of Iowa, [2]University of Missouri

The Addictions Neuroclinical Assessment framework posits three neurofunctional domains critical to addiction etiology. One domain is incentive salience (IS), the tendency to over-attribute incentive-motivational value to reward-predictive cues. A role for IS in addiction has been demonstrated in preclinical models, but human analogues of IS have been elusive. I will present data linking low sensitivity to alcohol's effects (LS), a known risk for alcohol use disorder (AUD), to heightened attribution of IS to alcohol-related cues—and linking laboratory behavioral and ERP measures of IS sensitization with risky patterns of drinking in the natural environment. Emerging adults (N=262) completed a picture-viewing task and an approach-avoidance task, both including images of alcoholic and nonalcoholic beverages. They then completed 3 weeks of ecological momentary assessment to record alcohol use in their daily lives (via smartphone). Relative to their higher-sensitivity (HS) peers, LS individuals showed (i) larger P3 responses to alcohol cues in both tasks, particularly when the task goal required an approach behavioral response; (ii) larger N450 (i.e., conflict) responses when the task goal required avoiding alcohol cues; and (iii) a behavioral approach bias for alcohol cues. In addition, larger alcohol cue-P3 and behavioral approach bias for alcohol cues forecast drinking episodes marked by faster consumption, and larger alcohol-avoidance N450 forecast elevated craving during those episodes. Implications for addictions neuroclinical assessment are considered.
FUNDING: National Institute on Alcohol Abuse and Alcoholism grant R01AA025451

ALCOHOL SENSITIVITY'S RELATIONSHIP WITH ALCOHOL CUE REACTIVITY IS MODERATED BY TRAIT DISINHIBITION AND DRINKING SEVERITY

Alexander Kallen
Florida State University

Lower alcohol sensitivity (AS) has been shown to predate and relate to heavier, more persistent alcohol use. Those low in

AS (LS), compared to high (HS), exhibit a larger alcohol cue-response P3 (ACR-P3), which links in turn to concurrent increases in cue-elicited craving, along with heightened alcohol-approach biases. ACR-P3 thus appears to reflect enhanced incentive salience for alcohol-related cues among LS, exacerbating risk for harmful drinking. My talk will report results from a study of 72 undergraduates (36 LS, 36 HS) examining whether trait disinhibition and/or drinking severity moderate AS-related ACR-P3 differences in a novel alcohol/nonalcohol cue task with effort demands. Findings point to parallel moderating effects of disinhibition and alcohol use severity on ACR-P3 for LS and HS. For those high (vs. low) in disinhibition, LS showed enhanced ACR-P3 whereas HS showed reduced ACR-P3. For heavier (vs. lighter) drinkers, LS and HS likewise differed in relative ACR-P3 (i.e., enhanced vs. reduced). Of note, these moderating effects were independent, capturing distinct variance in ACR-P3 amplitude differences. Findings provide further evidence for increased incentive salience of alcohol cues among LS, particularly when coupled with high trait disinhibition and/or heavy alcohol use. The implication is that disinhibition and heavier drinking may amplify bottom-up cue-driven processing of alcohol cues for LS, yet attenuate top-down goal-oriented processes among HS.

NEURAL REWARD HYPOSENSITIVITY AND TRAIT DISINHIBITION INTERACT TO PREDICT SUBSTANCE PROBLEMS IN ADOLESCENCE: AN FMRI INVESTIGATION

Keanan Joyner
University of California, Berkeley

Dysfunctional reward processing and disinhibitory tendencies have been highlighted as central to the development and maintenance of substance use disorders (SUDs). The literature emphasizes two different interpretations of the reward dysfunction observed in individuals with SUDs – one being that substance-free reward dysfunction arises as a consequence of repeated substance use, and the other being that substance-free reward dysfunction is mainly a liability for subsequent substance use. Further complicating these accounts are recent findings demonstrating a moderating role of trait disinhibition on the relationship between reward hyposensitivity and SUDs. The current work examined interactions between disinhibition and neural reward sensitivity (operationalized via nucleus accumbens [NAcc] activation in the monetary incentive delay [MID] task) in predicting SUDs assessed concurrently and prospectively in a notably large longitudinal sample (N ~ 2000). While disinhibition evidenced strong predictive value both concurrently and prospectively, age 14 NAcc activation was not related to SUDs as a main effect nor in an interactive manner. Additionally, dysfunctional NAcc activation was not a consequence of adolescent SUDs either, as overall substance use from age 14 to 19 was not predictive of observed change in NAcc activation between age 14 and 19. However, disinhibition and NAcc activation did interact to predict SUDs concurrently at age 19, such that those scoring high in disinhibition and showing blunted NAcc activation at this age exhibited the most substance problems.

LOW REWARD SENSITIVITY AS A SPECIFIC CONTRIBUTOR TO HARMFUL SUBSTANCE USE OUTCOMES OF EXTERNALIZING LIABILITY: A HITOP MODEL ANALYSIS

Christopher Patrick[1], Keanan Joyner[2]
[1]Florida State University, [2]University of California - Berkeley

Joyner et al. (Clin Psy Sci, 2019) reported evidence for reward hyposensitivity as a contributor to harmful substance use by showing that reduced reward-related ERP response was predictive of elevated symptoms of DSM-defined substance use disorders (SUDs) – especially among persons high in self-report assessed trait disinhibition. An intriguing interpretation, given evidence that trait disinhibition indexes general proneness to impulse-related problems, is that low sensitivity to naturally occurring rewards directs externalizing liability toward substance-related outcomes as opposed to aggressive-antisocial outcomes. We evaluated this possibility in the context of an influential dimensional framework for mental health problems, the Hierarchical Taxonomy of Psychopathology (HiTOP). Using data for a large (N = 666) adult sample, distinct substance-use and aggressive-antagonistic subdimensions of externalizing problems were modeled. Externalizing liability was quantified as a composite of scores on a trait disinhibition scale and an ERP marker of externalizing risk, oddball-P300 response. Reward sensitivity was quantified as enhanced neural reactivity to gain versus loss outcomes in a choice-feedback ("Doors") task. Analyses revealed that increased externalizing liability was related to elevated levels of both substance use and antagonistic symptomatology, whereas low reward sensitivity was related only to substance use outcomes of externalizing liability. Implications for understanding of SUDs, and general versus specific contributors to mental health problems, are discussed.

FACES OF THE FUTURE

Chairs: C.J. Brush[1], Cristina Ottaviani[2]
[1]Auburn University, [2]Sapienza University of Rome

This session highlights cutting-edge research conducted by emerging doctoral and post-doctoral scholars whose work is shaping the present and future landscape of psychophysiological science.

BEHAVIOURAL AND NEURAL DYNAMICS OF CATEGORY LEARNING ACROSS THE MENSTRUAL CYCLE

Mateja Perovic, Michael Mack
University of Toronto

A growing body of literature demonstrates widespread effects of ovarian hormones on the brain. However, resulting impacts on human cognition remain to be fully elucidated. Here we provide a multimodal account of cognition across the menstrual cycle using category learning – a core cognitive process that requires careful coordination of learning, memory and attention – as a

tool for capturing complex cognition. Using a newly developed method, we find that category learning varies across the menstrual cycle in a non-linear fashion that parallels the typical rise and fall of ovarian hormone estradiol across the cycle (N=171): accuracy increases steadily across the early follicular phase, peaks in the late follicular phase, and decreases again over the mid-late luteal phase. We replicate this behavioural effect in a follow-up MRI study (N = 42) and confirm that activation in brain regions supporting concept formation similarly varies across the menstrual cycle. Finally, we take the analysis a step further by examining hormone-gene interactions in participants tested at two points in the menstrual cycle using the same cognitive task (N=64). Results demonstrate that BDNF genotype, which affects neuroplasticity, modulates participants' sensitivity to estradiol fluctuations across the menstrual cycle as reflected in cognitive performance. Our results combine behavioural, imaging and genetic data to provide a comprehensive neurobiological account of learning and memory across the menstrual cycle.
FUNDING: This research is supported by Natural Sciences and Engineering Research Council (NSERC) Discovery Grants to MLM (RGPIN- 2017-06753, RGPIN-2024-0588), Canada Foundation for Innovation and Ontario Research Fund (36601) to MLM, Brain Canada Future Leaders in Canadian Brain Research Grant to MLM.

PSYCHOLOGICAL COSTS OF DISTRACTION ACROSS SEX: ETHNIC DIFFERENCES BY HRV

Darcianne K. Watanabe[1], Costanza Scatà[2], Alexandra T. Tara[3], Annie T. Ginty[1], Julian F. Thayer[1]
[1]University of California, Irvine, [2]University of Milan, [3]Baylor University

Studies show that avoidant coping may affect health and well-being differentially by ethnicity and sex. We examined whether ethnicity and heart rate variability (HRV), an autonomic balance index, moderated the distraction coping (CopeD)–stress link across sex. 765 college students (57% women; Mean age = 19.5 [1.6]) completed surveys and 10-min resting high-frequency HRV (log-HF). Asians (n = 152) had lower HF than Whites (n = 443; r = -.05 [-0.13, 0.03]) and Hispanics (n = 170; r = -.08 [-0.19, 0.03]). A 3-way interaction model controlling for waist circumference showed distinct race- and sex-based patterns in the positive CopeD–stress link across HF levels. The strength of the association declined with higher HF in Hispanic women (low: r = .24 [0.04, 0.43]; mean: r = .21 [0.01, 0.41]; high: r = .05 [–0.15, 0.25]) and White men (low: r = .20 [0.06, 0.35]; mean: r = .21 [0.07, 0.35]; high: r = .11 [–0.03, 0.26]), but remained stable in Asian women (rs: .12 to .18) and Hispanic men (rs : .05 to .07). In contrast, the positive CopeD-stress link was weakest at low HF and strongest at higher HF for White women (low: r = .13 [0.00, 0.25]; mean: r = .26 [0.13, 0.38]; high: r = .24 [0.12, 0.36]) and Asian men (low: r = .04 [–0.21, 0.27]; mean: r = .20 [–0.03, 0.43]; high: r = .21 [–0.02, 0.45]). Complex ethnic differences by HRV interactions suggest that the psychological costs of distraction coping may be contingent on joint cultural and physiological contexts. Implications will be discussed.
FUNDING: Darcianne K. Watanabe is supported by the National Science Foundation Graduate Research Fellowship Program under Grant No. DGE-1839285. This work was supported in part by the National Heart, Lung, and Blood Institute NIH K01HL145021).

THE ROLE OF PARENTS' MINDSETS IN HOW THEIR ADOLESCENT RESPONDS TO A SOCIAL STRESSOR

Audrey-Ann Journault
University of Rochester

Parents concerned by their teen's mental health may inadvertently encourage stress avoidance. Yet, stress is not all bad. Teens can learn to optimize their physiological stress responses (SR) to engage in valuable but demanding opportunities. SR can be a threat (prolonged, debilitating) or a challenge type (short, fostering adaptability) based on one's appraisals of acute stressful events and their SR as harmful or helpful. Stress mindsets shape these appraisals in specific stressors: believing stress is harmful leads to threat SR and avoidance, while embracing stress fosters challenge SR, growth, and improves outcomes. This study adapted a stress optimization intervention to empower parents to guide teens through stressful moments. Parents (Mage = 46.2, SD = 5.8, 86% Mother, 80% White) of 77 dyads randomly completed the intervention (or a control condition), aiming at shifting their stress mindsets to optimize their own and teen's SR (Mage = 14.8, SD = 1.3, 56% Girl) during a lab speech task in front of evaluators. Parents prepared their teens before they observed them giving the speech. We recorded continuous cardiac reactivity to assess SRs. Parents assigned to the intervention group exhibited more challenge-type SR (higher CO) when preparing their teen, indicating that the intervention helped them provide support. Moreover, parents in both conditions helped optimize their teens' SR (increase in CO from preparation to speech). Follow-up analyses will focus on sources of heterogeneity, such as prior mindsets, and language displays that successfully support children.
FUNDING: Canadian Institutes of Health Research

PERSON-CENTERED PROFILES OF MATERNAL PSYCHOPATHOLOGY SYMPTOMS AND CHILDHOOD MALTREATMENT PREDICT MOTHERS' DIFFERENTIAL STRESS PHYSIOLOGY IN RESPONSE TO CHILDREN

Sohee Park
Pennsylvania State University

Parental physiological regulation supports children's self-regulation development within parent-child interactions. Yet parents with greater risk factors such as psychopathology symptoms and childhood maltreatment histories show atypical physiological regulation (Lunkenheimer et al., 2018). Since these risks often co-occur, person-centered approaches may clarify how differential risk profiles influence parents' adaptive vs. maladaptive physiological stress responding to children. At-risk mothers with 3-year-old children (N=149) were asked to support children in a challenging dyadic puzzle task. Mothers reported their own depressive and anxiety symptoms and maltreatment during childhood. Respiratory sinus arrhythmia (RSA) was recorded in 30-s epochs during the parent-child task. Resting RSA

was measured while watching calm nature videos. Four groups were identified in latent profile analysis: a childhood maltreatment (CM) resilient group, a high-risk psychopathology group, a high-risk CM group, and a low-risk group. The low-risk group, characterized by low symptoms and low CM history, exhibited decreasing RSA across the task, suggesting physiological engagement and support of children. Both groups with CM histories exhibited few RSA changes (flat) during the task, indicating lower reactivity and engagement, but the resilient group showed higher resting RSA whereas the high-risk group showed lower resting RSA. The high psychopathology group showed a drastic quadratic decreasing pattern over time, representing exaggerated reactivity/higher stress when supporting children.
FUNDING: NIH

BIDIRECTIONAL EFFECTS OF PARENTING BEHAVIORS AND CHILD NEURAL DEVELOPMENT IN RESTING-STATE ALPHA/DELTA RATIOS

Marybeth McNamee, Rebecca Brooker
Texas A&M University

The first interpersonal relationship most children form is with their parents. Parenting behaviors influence child development in well established parent-to-child effects (Bernier, Calkins, & Bell, 2016), but the impacts of child development on parenting behaviors (child-to-parent effects) are understudied. The mechanisms by which bidirectional effects of the parent/child relationship may manifest are even less well understood. One possibility is that parent behaviors reflect efforts from parents to respond to real or perceived needs and abilities in offspring. Notably, critical developmental advancements in early life are supported by neural processes that are likely to both elicit and respond to parent behavior (Feldman, 2015). Thus, neural maturation itself is one possible mechanism for early bidirectional effects. We tested this possibility in a longitudinal sample of children (N = 117, 47 males) and parents at child ages 3, 4, and 5. Neural maturation was quantified using a ratio of total Alpha to Delta power (ADR) derived from a 5-minute baseline EEG. Parent behaviors were assessed via self-report and observations. A cross-lagged panel model revealed that less mature child ADR at age 3 predicted greater self-reported maternal insensitivity at age 4 (child-to-parent; $\beta = -.18$, $p = .05$); greater observed insensitive parenting at age 4 predicted a less mature child ADR at age 5 (parent-to-child; $\beta = -.24$, $p = .05$). Findings indicate a likely role for neural maturation in a truly bidirectional association between child development and parents' behaviors.
FUNDING: NIH K01-MH100240

THE IMPACT OF MATERNAL TRAUMA ON CHILDREN'S OBSERVATIONAL FEAR LEARNING

Christine Truong[1], Émilie Rudd[2], Alexe Bilodeau-Houle[2], Myriam Beaudin[1], Maryse Arcand[2], Marie-France Marin[1]
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Interpersonal trauma, which disproportionately affects women, is often associated with post-traumatic stress disorder (PTSD) symptoms, such as heightened and dysregulated fear responses. These impacts can extend beyond the victims, increasing the risk of PTSD and other psychopathologies in their children. Observational fear learning within the mother-child dyad has been proposed as a mechanism underlying this heightened risk. Given that girls typically exhibit stronger fear responses than boys, the child's sex must be considered. This study examines how maternal trauma influences children's observational fear learning. The sample includes 141 children (70 boys), aged 8 to 12, grouped by maternal trauma exposure (n = 78) or no exposure (n = 63). Children observed their mother and a stranger during a fear conditioning protocol, in which one color was paired with a shock for the mother (CS+M), another for the stranger (CS+S), and a third with no shock (CS-). Stimuli were later presented to the children without shocks; first trials measured fear acquisition and final trials assessed fear extinction through skin conductance response (SCR). A Stimulus*Group*Sex interaction was found [$F(2, 620.35) = 3.60$, $p = .028$], with girls in the trauma group showing higher SCRs to the CS+M compared to controls during fear acquisition ($p = .03$). These results highlight the role of learning mechanisms in the intergenerational transmission of fear and the importance of considering sex differences.
FUNDING: Canadian Institutes of Health Research (CIHR) Canada Foundation for Innovation (CFI) Institut universitaire en santé mentale de Montréal Foundation Canada Research Chair in Hormonal Modulation of Cognitive and Emotional Functions

TIME-VARYING CHANGES IN VISUOCORTICAL TUNING DURING AVERSIVE CONDITIONING AND EXTINCTION: TRIAL-BY-TRIAL SSVEP ANALYSES AND PERSISTENCE AND FLEXIBILITY OF SENSORY PLASTICITY

Judith Cediel Escobar, Laura Ahumada, Andrew Farkas, Faith Gilbert, Hannah Engle, Andreas Keil
University of Florida

Threat learning induces dynamic adaptations in sensory cortical processing, yet the fine-grained temporal evolution of these changes remains poorly understood. In this study, we used electroencephalography and steady-state visual evoked potentials (ssVEPs) to track trial-by-trial visuocortical responses during aversive conditioning and extinction. Participants viewed phase-reversing Gabor gratings of varying orientations, with one orientation (CS+) consistently paired with an aversive noise during the acquisition phase. Early during acquisition on Day 1, visuocortical responses exhibited broad generalization, with enhanced activity across multiple orientations. As learning progressed, neural responses became progressively sharpened, showing selective amplification of the CS+ and suppression of neighboring stimuli, consistent with a lateral inhibition model. Immediate extinction learning resulted in a rapid decrease in overall visuocortical activity and a reduction in tuning. Importantly, incorporating data from Day 2 revealed a partial reinstatement of CS+-specific sharpening after a 24-hour consolidation period, despite prior extinction. Single-trial analyses confirmed dynamic fluctuations in tuning across learning phases, suggesting that sensory cortical plasticity initially generalizes broadly, refines through associative learning, and can persist beyond extinction. These findings demonstrate the

flexibility and durability of visuocortical threat representations, highlighting the sensory cortex as a key node in the consolidation and spontaneous recovery of fear memories.
FUNDING: NIH

EMOTIONAL INFLEXIBILITY AND REACTIVITY AS RISK FACTORS FOR FEAR-RELATED SYMPTOMATOLOGY: A COMBINED EMA AND FMRI STUDY

Ha Jeong Park, Annmarie MacNamara
Texas A&M University

Affective inertia, the tendency for one's affective state to persist, may play a role in the maintenance and worsening of internalizing symptoms. In addition, heightened amygdala activation may predict worsening psychopathology. Combining measures of daily affect and fMRI BOLD may yield new insight that is not possible using one measure alone. Here, we examined whether positive and/or negative affect (PA and NA) inertia would moderate the prospective association between amygdala activation and internalizing symptoms one year later. In Year 1, a mixed internalizing sample (n = 76) completed a passive picture-viewing task during fMRI, followed by 10 days of ecological momentary assessment (EMA) of daily affect. Self-reported internalizing symptoms were assessed at Year 1 and Year 2, yielding three underlying components: Distress, Fear, and OCD. PA/NA inertia were estimated using multilevel modeling of EMA, and amygdala activation was extracted for Positive > Neutral and Negative > Neutral pictures. Amygdala activation, affective inertia, and their interaction were entered as predictors of Year 2 internalizing dimensions, separately for PA/NA. Heightened amygdala activation and higher PA/NA inertia in Year 1 predicted greater increases in Year 2 Fear symptoms (NA X amygdala, $\beta = .254$, $p = .006$; PA X amygdala, $\beta = .190$, $p = .018$; main effect of amygdala, $\beta s > .173$, $ps < .03$); no effects for other symptom dimensions. As such, emotional inflexibility, paired with stronger neural reactivity to emotional stimuli, may be a risk factor for developing worse fear-related symptoms.
FUNDING: NIMH R01MH125083 (to AM)

EEG CORRELATES DURING THE EMOTIONAL PROCESSING OF PERSONALIZED SHORT-VIDEO CONTENT AND INTERNALIZING SYMPTOMS IN YOUNG ADULTS

Carole Leung, Alva Tang
University of Texas at Dallas

Time spent on social media is linked to more internalizing symptoms, but users with similar screen time may receive varied algorithm-generated content. To date, little is known about how individuals process such content and how it relates to mental health. This study addressed the gap by examining associations between personalized short-video content and frontal alpha asymmetry (FAA), the difference in alpha EEG power between left and right frontal regions, reflecting emotional processing and depression risk. We also examined the link between FAA and internalizing symptoms. Fifty-seven young adults (78.9% females, mean age=20.23) completed a short-video task with EEG recording, in which they watched 32 personally recommended videos extracted from their Instagram or TikTok account and 32 generalized videos from new user accounts. A content analysis was used by two coders to categorize personalized videos using Shutsko (2020)'s system. Participants also completed a scale on anxiety and depression. Results adjusting for sex and weekly short-video app screen time showed that adults who watched fewer positive relationship videos displayed more right frontal alpha activation (associated with negative affect) when viewing personalized, but not generalized, videos. More right frontal alpha activation was, in turn, associated with higher depression scores. The indirect effect linking algorithm-generated content to depressive symptoms through FAA suggests that algorithms may reinforce emotional content and processing on social media, as well as pre-existing depressive symptoms.
FUNDING: University of North Texas and University of Texas at Dallas social science seed grants

REWARD PROCESSING AND ANGER IN YOUTH WITH TOURETTE SYNDROME

Simon Morand-Beaulieu, Anna Weinberg
McGill University

Children with Tourette Syndrome (TS) often experience explosive outbursts–intense, uncontrollable anger reactions triggered by minor events–which are among the most challenging symptoms for youth with TS and their families. However, the brain activation patterns associated with these outbursts remains poorly understood. Research on ADHD, which commonly co-occurs in TS, has linked enhanced irritability with increased reward-related electrophysiological activity. This study examined whether electrophysiological measures of reward processing were associated with feelings of anger in youth with TS. Twenty-nine typically developing children (TDC) and 38 children with TS (aged 10-14) completed the Doors task while EEG was recorded. The reward positivity (RewP), delta, and theta oscillations were extracted from feedback-locked data. Anger reactions were assessed with the Children's Inventory of Anger (ChIA), a self-report measure of anger feelings in hypothetical situations. Children with TS scored higher on ChIA than TDC. Greater delta responses were significantly associated with higher ChIA scores. There was also a significant interaction between group and ChIA total scores, such that the association with delta was only significant for children with TS. RewP and theta were not significantly related to ChIA, though effects were in the same direction. These findings suggest that increased reward-related delta is associated with enhanced feelings of anger in youth with TS. This provides preliminary evidence that the reward system functioning may contribute to explosive outbursts.
FUNDING: This work was funded by the CIHR, though a post-doctoral fellowship (MFE164627) awarded to SMB, and by the Clinical Research Training Scholarship in Tourette syndrome (also awarded to SMB) from the TAA & ABF, in collaboration with the AAN. SMB received additional financial support from the CIUSSS-NIM.

NAVIGATING INTEROCEPTIVE CROSSROADS: THE INTERPLAY OF BODILY SIGNALS, EMOTION, AND STRESS

Chair: Christine Schillings; Co-Chair: Olga Pollatos
Ulm University

This symposium addresses the fundamental role of interoception – the perception and integration of bodily signals – in the interplay with emotional processing and stress. The first presentation focuses on the association of cardiac interoception and emotion regulation during social stress. Acknowledging stress as a key factor influencing eating behavior, the second presented study investigated how acute stress affects gastric interoception in conjunction with eating traits and emotion regulation, utilizing a novel paradigm to assess gastric interoception. Based on the interplay between ascending interoceptive signals and descending stress signals, the third presentation comprises three studies investigating stress effects on heartbeat-evoked potentials. The fourth presentation addresses neural networks underpinning interoceptive abilities and emotional processing. Focusing on approaches to improve interoceptive abilities, in the last talk, findings from two studies exploring the potential of (neuro)modulation techniques, namely, transcutaneous auricular vagus nerve stimulation and heart rate variability biofeedback, will be presented. By integrating findings from studies across different interoceptive modalities (cardiac, gastric), exploring the impact of stress (acute, chronic), the role of emotional processing, and underlying neural mechanisms, this symposium offers a comprehensive perspective on the relationships between interoceptive processing, emotion, and stress, and highlights the potential for targeted interventions to enhance interoceptive abilities.

THE DOUBLE-EDGED SWORD OF INTEROCEPTION IN COPING WITH SOCIAL STRESS: MODERATING EFFECTS OF REAPPRAISAL

Lorenz Rapp, Olga Pollatos
Ulm University

A more precise perception of physiological changes during the emergence of emotions might facilitate the subsequent regulation of the latter and this should only be the case if a person has sufficient regulatory strategies. This study examines whether precise perception of bodily signals aids emotion regulation (ER) and how this depends on available ER strategies. Eighty-three healthy participants (mean age = 23.18 years (SD = 4.14), female = 73.49%) completed the Reappraisal subscale of the Emotion Regulation Questionnaire and performed the heartbeat counting task to assess their cardiac interoceptive accuracy (IAcc), i.e., how accurately they could perceive their heartbeat. In addition, they underwent the Trier Social Stress Test (TSST), reporting their state anxiety using the State-Trait Anxiety Inventory (STAI) before and after the stress induction. A regression model indicated that changes in state anxiety from pre- to post-TSST could be predicted by IAcc, with Reappraisal score acting as a moderator: individuals with higher IAcc and elevated Reappraisal score exhibited a smaller rise in state anxiety, while those with higher IAcc but lower score experienced a greater increase. These findings indicate that accurate cardiac interoceptive perception might help mitigate emotional decline during social stress if individuals possess adequate ER strategies. However, when these strategies are insufficient or absent, individuals may be more susceptible to heightened negative emotions, potentially as a result of their more accurate perception of physiological signals.

THE IMPACT OF ACUTE STRESS ON GASTRIC INTEROCEPTION: MODULATING EFFECTS OF EMOTION REGULATION AND EATING TRAITS

Miriam Kipping[1], André Schulz[2], Olga Pollatos[1]
[1]Ulm University, [2]University of Luxembourg

The impact of eating behavior on physical and mental health underscores the importance of understanding its regulation. Stress has been identified as a key factor influencing eating behavior, though its effects vary between individuals. To explore underlying mechanisms, we examined how acute stress affects gastric interoception – the perception of stomach signals – alongside eating traits and emotion regulation abilities. We recruited 94 sober adults, who completed both a stress-inducing and a control task in separate laboratory sessions. Following these tasks, gastric interoceptive sensitivity was assessed using a novel method – the Magic Table – in which participants consumed yogurt from a self-refilling bowl until they perceived fullness and satiation. A subgroup also completed the water load test (WLT), a validated gastric sensitivity measure. Results showed no overall difference in gastric interoceptive sensitivity between stress conditions. However, individuals with high but not low levels of emotion regulation difficulties, dietary restraint, and uncontrolled eating exhibited reduced fullness sensitivity under high stress compared to low stress. The Magic Table was highly correlated to the WLT supporting its validity. The findings highlight the importance of gastric interoception in stress-related eating behavior and the need for interventions targeting gastric interoception in programs addressing dysregulated eating. The results will be discussed in the context of emerging interoception-focused interventions, such as vagus nerve stimulation.

STRESS AFFECTS CARDIAC INTEROCEPTIVE ATTENTION, AS REFLECTED BY HEARTBEAT-EVOKED POTENTIALS

André Schulz[1], Lisa Lai[1], Silja Bellingrath[2], Annika Lutz[1], Lisa Drost[1], Robert Kumsta[1], Claus Vögele[1]
[1]University of Luxembourg, [2]University of Duisburg-Essen

Interoception involves ascending signals, whereas stress is an example of descending signal transmission on the brain-body axis. As ascending and descending signals are inter-connected in regulatory circuitries, stress may affect interoception. Previous studies demonstrated that acute stress may increase interoceptive accuracy as assessed via a heartbeat counting task (HCT), whereas the mechanisms behind stress effects on interoceptive signal processing remained unclear. In three studies

we investigated stress effects on heartbeat-evoked potentials (HEPs) both during rest or a distraction task, each compared to a HCT. Acute stress was evoked by a socially-evaluated cold pressor test. Average HEP amplitudes may reflect cortical representation of cardio-afferent signals, whereas HEPs responsiveness to a HCT is considered an indicator of interoceptive attention (IAt). In study 1 (N=21) we found that acute stress enhances average HEP amplitudes. Study 2 (N=66) showed IAt to increase after acute stress, which might be due to cortisol release by the stressor. Finally, acute stress effects on IAt are mitigated by self-reported chronic stress, as suggested by Study 3 (N=68). Hence, stress affects interoceptive signal processing at different stages. In detail, acute stress enhances cortical representation of and allocation of attention to interoceptive signals. Notably, these effects may reverse in states of chronic stress. The latter implies dysregulated bi-directional brain-body signal transmission, which might be one mechanism behind the generation of somatic symptoms.
FUNDING: Parts of this work have been supported by the Research Support Department of the University of Luxembourg, project "INSTRESS". PI: André Schulz

MAPPING THE INTEROCEPTION-EMOTION LINK: A MULTI-FACETED fMRI STUDY

Jasmin Schultze[1], Thomas Kammer[2], Georg Grön[2], Martin Ulrich[2], Olga Pollatos[1]
[1]Ulm University, [2]Ulm University Hospital

Prominent emotion theories, empirical findings, and neuroimaging studies highlight a close link between interoception and emotional experience. Understanding this relationship is critical, as both interoceptive abilities and emotional experiences are altered in mental health disorders. This talk presents an fMRI study with a strong, multidimensional design assessing interoception and emotion across several facets. The study investigated the behavioral link and neural overlap between interoception and emotion, as well as the connectivity between brain regions involved in interoceptive and emotional processing, identifying potential targets for future neurostimulation. Twenty-five healthy young men completed a comprehensive assessment of interoception and emotional experience, incorporating self-report measures, behavioral tasks, and novel indices of cardiac (HRD, Legrand et al., 2021) and respiratory interoceptive accuracy (RRST, Nikolova et al., 2022). During 3T fMRI, participants performed a heartbeat counting task (interoceptive), a tactile counting task (exteroceptive control), and a novel task integrating simultaneous interoceptive and emotional processing (with an exteroceptive control). Preliminary analyses revealed increased insular activation in the interoception × emotion condition compared to all others, suggesting that emotional focus may enhance interoceptive processing at the neural level. This talk will present the full behavioral and neural results and discuss their implications for emotion-interoception interactions and neuromodulation approaches.

***Symposium* IV-2**

BIOPSYCHOSOCIAL PERSPECTIVES ON EMOTION REGULATION: INDIVIDUAL DIFFERENCES, INTERVENTIONS, AND META-ANALYTIC INSIGHTS

Chair: Marc Jarczok[1]; Co-Chair: Cristina Ottaviani[2], Discussant: Julian Thayer[3]
[1]Clinic for Psychosomatic Medicine and Psychotherapy Ulm, [2]Sapienza University of Rome, [3]University of California, Irvine

This symposium focuses on the multifaceted aspects of emotion regulation (ER), spanning fundamental psychophysiological mechanisms to clinical interventions. We begin with a systematic meta-analysis examining the correlation between self-reported ER strategies and resting vagal tone, evaluating the validity of vagal tone as a marker for emotional adaptation. Transitioning to the influence of sociocultural factors, a central emphasis is placed on investigating cultural modulators of ER, specifically the differential role of emotion suppression in modulating the association between stress and cardiovascular risk in Japanese and American cohorts. Building upon these contextual considerations, we present experimental studies analyzing the effects of heart rate variability biofeedback (HRV-BF) on anxiety symptoms, elucidating the causal relationships between increased HRV and anxiety reduction. Moving further into the neural underpinnings of ER, we discuss neuroscientific studies examining the impact of maladaptive ER, particularly repetitive negative thinking, on reward processing using behavioral and electrophysiological methods. Finally, we present a clinical translation of these findings reporting a RCT evaluating the therapeutic efficacy of slow-paced breathing (SPB) in psychosomatic patients, with a focus on modulating emotional control mechanisms. Collectively, these studies provide an integrative overview of current ER research, encompassing both fundamental mechanisms and clinical applications, highlighting the significance of individual and cultural contexts.

THE ASSOCIATION OF EMOTION REGULATION STRATEGIES WITH RESTING VAGAL TONE, A SYSTEMATIC REVIEW AND INDIVIDUAL PARTICIPANT DATA META-ANALYSIS

Nina Kupper[1], Stefanie Duijndam[1], Gwen Gerla[1], Marc Jarczok[2]
[1]Tilburg University, [2]University Medical Center Ulm

The neurovisceral integration model proposes that the ability to adapt to situational challenges is related to biological flexibility within the central autonomic network, reflected by vagal tone. A higher vagal tone during rest therefore would signal a better emotional adaptation. The current study examined to what extent self-reported ER strategies are associated with resting vagal tone. Medline and Psychinfo were systematically searched for studies on ER and HRV, and 39 studies were contacted for their data. In a preliminary data analysis of 5 samples, we examined the association between ER and resting vagal tone. Single-step IPDMA was performed using multilevel analysis, with sample as a random effect. Cluster effects (sample differences) were evaluated using the ICC. The preliminary sample included

1553 participants (5 samples: female sex 54-74%; age youngest: 19.5±2.9; age oldest: 57.5±12.9). ICC indicated that 21% of the variance in RMSSD was due to sample differences, which was fully explained by age differences. Analysis showed that the raw score (B = .017, se = .009, t=1.89, p=.059) and cohort mean of reappraisal (B = -.575, se = .247, t = -2.329, p = .068) were not significantly associated with the √(RMSSD). For the raw score (B=-.009, se = .012, t = -.757, p=.449) and the cohort mean of suppression (B=-.321, se = .159, t = -2.020, p = .098) no significant associations with √(RMSSD) were found. Resting HRV may not be a good measure for emotional adaptation as assessed with ER strategy tendencies.

EMOTION SUPPRESSION MODERATES THE LINK BETWEEN STRESS AND CARDIOVASCULAR DISEASE RISK IN JAPANESE AND AMERICANS

Darcianne K. Watanabe[1], Shinobu Kitayama[2], DeWayne P. Williams[1], Julian F. Thayer[1]
[1]University of California, Irvine, [2]University of Michigan

Prior work has found that emotion suppression is linked with adverse outcomes in Westerners (Americans) but not Easterners (Japanese). Cultural differences between Easterners and Westerners in biological stress responses and suppression use suggest these factors may have different implications for cardiovascular disease (CVD) outcomes. This study examines if suppression differentially moderates the relationship between stress and CVD risk among Japanese and American adults from the Midlife in Japan and U.S. studies were included (Japanese: N=315; Americans: N=524). Predictors were stress (Perceived Stress Scale) and median split suppression via the Emotion Regulation Questionnaire suppression scale. The outcome was a composite CVD risk score computed with BMI, C-reactive protein, interleukin-6, systolic BP, and the total to HDL ratio, per the American Heart Association's CV health index. Adjusting for age, sex, education, tobacco, alcohol, and prescription medication use, linear regressions revealed cultural differences among those with high suppression (rz = -.10 [-0.19, -0.01]). Higher stress was linked with higher CVD risk in Americans and lower CVD risk among Japanese with high suppression (rz = -.09 [-0.23, 0.05]). Findings suggest that adaptive ER moderates the association between stress and CVD risk and that suppression is not universally 'maladaptive.' Results emphasize the importance of considering cultural context when assessing the impact of emotion suppression on health, which may help explain differences in CVD outcomes between Easterners and Westerners.
FUNDING: This research was supported by a grant from the National Institute on Aging (R37AG027343) to conduct a study of Midlife in Japan (MIDJA) for comparative analysis with Midlife in the U.S. (MIDUS; P01-AG020166). Darcianne K. Watanabe is supported by the National Science Foundation Graduate Research Fellowship Program under Grant No. DGE-1839285. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

AN EXPERIMENTAL EXAMINATION OF HEART RATE VARIABILITY BIOFEEDBACK TRAINING ON SYMPTOMS OF ANXIETY

David Spalding[1], Toni Ejoor[1], Liberty Wade[1], Elif Nalcaci[1], Tang-Ni Chuang[1], Milan Valášek[2], Cristina Ottaviani[3], Colette Hirsch[1], Hugo Critchley[4], Frances Meeten[1]
[1]King's College London, [2]Bauhaus-Universität Weimar, [3]University of Sapienza, Rome, [4]Brighton and Sussex Medical School, University of Sussex

Generalised anxiety disorder (GAD) is characterised by excessive worry, deficits in inhibitory control, and low heart rate variability (HRV). To date, the literature linking HRV and cognitive processes relevant to GAD is predominantly correlational. We present a multi-session experiment designed to examine the causal relationship between increased HRV and anxiety symptoms. Participants (N=128) with high levels of trait anxiety (GAD7 questionnaire 10 or above) and worry (Penn State Worry Questionnaire 62 or above) were randomised to an experimental or active control condition. Those in the experimental condition attended four lab sessions over three weeks and a follow-up session one month later. They were gradually introduced to HRV biofeedback (HRVB - to increase HRV), beginning with slow-paced breathing and abdominal breathing, and daily home practice. The control condition completed the same procedure, except that all the breathing practices used their own mean breathing rate, determined in the first lab session. Preliminary analyses indicate a main effect of 'time' with a statistically significant reduction in anxiety ($p = < .001$) from baseline to session four (end of lab training period) that is maintained at follow-up. However, there was no difference in anxiety by condition allocation ($p > 0.05$) suggesting no effect of HRVB on anxiety. This finding will be contextualised by examining the specific effect of the breathing protocols on HRV metrics both during lab-based breathing training and by comparing resting state HRV at baseline, session four and follow-up.
FUNDING: This study was funded by the Medical Research Council (Grant number: MR/W005077/2)

THE IMPACT OF MALADAPTIVE EMOTION REGULATION ON REWARD PROCESSING: BEHAVIORAL AND ELECTROPHYSIOLOGICAL EVIDENCE IN DEPRESSION VULNERABILITY

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Anhedonia and repetitive negative thinking (RNT) are core features of depression. Despite growing evidence suggesting their interaction in sustaining depression, the underlying mechanisms remain insufficiently understood. This study utilized a within-subjects design to examine the effects of experimentally induced RNT on reward processing during the Probabilistic

Reward Task (PRT) in 62 individuals (n = 38 females) with varying depressive symptom severity. Reward responsiveness was assessed behaviorally through response bias and electrophysiologically via feedback-related positivity (FRP). Compared to an active control condition, the RNT induction led to a significantly impaired response bias ($F = 17.65$; $p < .001$, $\eta p2 = .23$) and FRP amplitude ($F = 6.49$; $p = .011$, $\eta p2 = .11$), with effects most pronounced in individuals with more severe depressive symptoms (-0.17, [-0.26, -0.09], $p > .001$ and -1.42 [-2.51, -0.34], $p = .011$, respectively). Moreover, FRP amplitude was negatively correlated with both reward response bias ($r = -0.31$) and subjective changes in RNT ($r = -0.30$). These findings indicate that acute RNT exacerbates deficits in reward processing at both behavioral and neural levels, particularly in individuals highly vulnerable to depression. By elucidating the mechanisms linking maladaptive emotion regulation to anhedonia, this study highlights the critical role of RNT in worsening reward-related impairments and underscores the potential for targeted interventions aimed at mitigating its impact on depressive symptomatology.
FUNDING: The present work was partially supported by Sapienza University of Rome grants RM11715C7F74C683 (CO) and AR223188B3133F0E (MS). DAP was partially supported by National Institute of Mental Health grants 5R37 MH068376.

FROM RESPIRATION TO NEURAL REGULATION: EVIDENCE FROM A CLINICAL RCT ON SLOW PACED BREATHING AND EMOTIONAL CONTROL

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Clinic for Psychosomatic Medicine and Psychotherapy Ulm

Patients with psychosomatic disorders frequently exhibit deficits in emotion regulation. Neuroimaging investigations have demonstrated that practices such as slow-paced breathing (SPB) can modulate functional connectivity within neural networks implicated in emotion regulation. However, the therapeutic efficacy of SPB in psychosomatic patient populations remains unclear. The VAST RCT investigates whether SPB enhances emotional control during the waiting period. This ongoing, preregistered clinical RCT (DRKS00032629) allocates patients to either TAU or Tau+SPB (6 breaths/minute, 4:6 inhale-exhale ratio, 10 minutes twice daily). Primary outcome is the Emotional Processing Scale (EPS25), analyzed via linear mixed models. Of 72 patients enrolled, 54 (44% male, mean age 40±12) completed an initial phase (4 weeks). Primary diagnoses included major depressive disorder (68%), somatoform disorder (24%), and generalized anxiety disorder (8%). The SPB group was stratified into protocol-adherent (≥70% practice, N=16) and non-adherent (<70%, N=8) subgroups, while the TAU group comprised 30 patients. A statistically significant group-by-time interaction was observed for emotional control (EPS25 subdimension) ($\chi^2(2)=7.91$, $p=.019$). However, no significant effects were found for other EPS25 subdimensions or the overall EPS25 mean score ($\chi^2(2)=5.74$, $p=.056$). These preliminary findings suggest that adherence to SPB may facilitate improvements in emotional control. Ongoing longitudinal assessments will further elucidate the sustained efficacy of SPB in psychosomatic patient populations.

***Symposium* IV-3**

EXPANDING THE MULTIVERSE: APPLIED EXAMPLES AND THE GROWING IMPACT OF MULTIVERSE ANALYSES IN PSYCHOPHYSIOLOGICAL RESEARCH

Chair: Peter Clayson[1]; Co-Chair: Michael Larson[2]
University of South Florida[1], Brigham Young University[2]

Psychophysiological research generates large amounts of data, and researchers face many analytical decisions—creating a multiverse of possible outcomes. Multiverse analyses systematically evaluate how defensible choices impact findings. With the growing recognition that small variations in preprocessing, statistical modeling, and operationalization can substantially influence conclusions, multiverse approaches are increasingly used; however, applying multiverse techniques requires consideration of task-specific effects, measurement consistency, and implications for theory. Thus, the current symposium presents applied examples of multiverse analyses and their effects across several psychophysiological domains. Francesco Versace et al. tested how preprocessing pipelines affect the late positive potential (LPP) as an emotional biomarker. Hannes Carsten et al. used a cooperative forking paths analysis to assess the robustness of reward positivity (RewP) findings in relation to depressive symptoms. Kaylie Carbine et al. applied a multiverse approach to test whether neural indices of inhibitory control reliably predict dietary intake. Bohyun Park et al. examined the generalizability of performance monitoring ERP-behavior relationships across multiple cognitive tasks. Roslyn Harold et al. analyzed the relationship between error-related negativity (ERN), trait neuroticism, and internalizing symptoms to determine whether effects are task-specific or broadly generalizable. The symposium concludes with a discussion on future directions an potential pitfalls of applying the multiverse.

OPTIMIZING THE LATE POSITIVE POTENTIAL PREPROCESSING PIPELINE: ACTIVE ELECTRODES JOIN THE DEBATE

Francesco Versace[1], Chiara Gramegna[2], Bryan Williams[3], Heather Webber[4]
[1]UT MD Anderson Cancer Center, [2]RWTH Aachen, [3]The University of Texas MD Anderson Cancer Center, [4]University of Texas Health Science Center at Houston

The late positive potential (LPP) is an ERP component widely used to study emotional processes and has been proposed as a neuroaffective biomarker. However, its clinical utility depends on standardized elicitation and data processing procedures. Here we applied a multiverse analytic approach to examine how different preprocessing pipelines impact LPP data quality (indexed by the standardized measurement error) and statistical power (simulating 10,000 experiments comparing responses to emotional vs. neutral images). We examined the effects of artifact detection, bad channel interpolation, and bad segment deletion using data collected using passive (158 participants) or active electrodes (43 participants). We collected data during a

passive picture viewing presentation that included both high- and low-arousing images. The results showed that while the LPP emotional modulation was consistently present across all processing pipelines, optimizing artifact rejection parameters was crucial for improving data quality and boosting statistical power, increasing the probability of detecting effects ($p<.05$ differences between emotional and neutral conditions) by up to 40%. Additional preprocessing steps provided only minor gains. These findings demonstrate that the LPP's emotional modulation is robust to preprocessing variations. Standardized stimulus presentation and optimized artifact rejection procedures enhance the LPP's reliability as a neuroaffective biomarker, supporting its translational applications in personalized clinical interventions for affective and addictive disorders.
FUNDING: This work was partially supported by the National Institute on Drug Abuse of the National Institutes of Health through grants R01DA032581 to FV and F32DA048542 to HEW.

THE IMPACT OF ANALYTICAL DECISIONS ON THE ASSOCIATION OF DEPRESSIVE SYMPTOMS AND REWARD POSITIVITY: RESULTS FROM A COOPERATIVE FORKING PATHS ANALYSIS

Hannes Carsten, Kai Härpfer, Katharina Paul, Jan Wacker, Anja Riesel
University of Hamburg

A growing number of studies link reduced neural responses to reward to depressive symptoms and increased risk for depression. The reward positivity (RewP) might point towards vulnerability for depression, but findings in subclinical samples are mixed, which could stem from heterogeneity in analytical approaches. This study sought to examine links between RewP and depressive symptoms, while quantifying evidence across defensible analytical decisions (i.e., forking paths). In this preregistered multicenter study, N = 686 participants from a community sample completed a gambling task, manipulating reward magnitude. We conducted cooperative forking paths analyses to assess the robustness of the results and quantify the impact of analytical decisions (e.g., filters, referencing, baseline, quantification channel, outlier treatment). An unexpected small effect emerged, indicating that increased depressive symptoms led to increased RewP. No association arised between RewP and anhedonia and no impact of reward magnitude was found. Forking paths analyses demonstrated a relative robustness of the results to most preprocessing decisions, while the quantification of the event-related measures (e.g., mean activity vs. peak-to-peak) influenced the observed outcome pattern. The present project holds the potential to inform future studies by quantifying and highlighting the impact of quantification decisions on associations of individual differences in depressive symptoms, anhedonia and RewP. This might foster transparency in analytical decisions and replicability of findings.
FUNDING: A research grant from the Deutsche Forschungsgemeinschaft (DFG) covered the costs associated with the realization of the CoScience project described in the abstract. Grant numbers: WA2593/9-1, MU3535/7-1, BE 2443/12-1, STA 1035/6-1, HI 1780/6-1, STR 615/7, HE 5330/15-1, HE2443/16-1, OS422/7-1, PA4014/2-2

A MULTIVERSE ANALYSIS ON THE RELATIONSHIP BETWEEN INHIBITORY CONTROL AND CALORIC AND CARBOHYDRATE INTAKE: AN EVENT-RELATED POTENTIAL (ERP) STUDY

Kaylie Carbine[1], James LeCheminant[2], Michael Larson[2]
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Multiverse analyses strengthen the robustness of psychophysiological research by evaluating the influence of various analytical choices on statistical results. The relationship between neural measures of inhibitory control and food intake is one such area where researchers face multiple analytical decisions regarding inclusion and operationalization of variables. Although individuals with higher inhibitory control generally exhibit better diet-related outcomes, the relationship is inconsistent, questioning the reliability of results. We tested a multiverse of relationships between neural indices of inhibitory control and caloric or carbohydrate intake while controlling for age, biological sex, weight, and body mass index (BMI). No-go and difference (no-go minus go) amplitudes for the N2 event-related potential (ERP) component were used as neural indices of inhibitory control. A sample of 288 participants (Mage=25.89, SDage=7.50) completed a high-calorie go/no-go task while ERP data were recorded. Food intake was recorded using the online Automated Self-Administered 24-hour Dietary Assessment Tool. Results found neither N2 no-go nor difference amplitude significantly predicted caloric or carbohydrate intake (ps>.05). Biological males, heavier individuals, and those with higher BMIs tended to consume more food. As measured by the N2 ERP component, inhibitory control on its own does not relate to food intake. Other measures of inhibitory control and diet-related factors, like dietary restraint, need consideration when testing the link between inhibitory control and diet.
FUNDING: Brigham Young University Research and Administration Office; Brigham Young University Graduate Studies; Brigham Young University MRI Research Facility; Brigham Young University College of Life Sciences; Brigham Young University College of Family, Home, and Social Sciences; American Psychological Foundation F.J. McGuigan Dissertation Scholarship; American Psychological Foundation William C. Howell Scholarship

A MULTIVERSE APPROACH TO PERFORMANCE MONITORING: AN EXAMINATION OF ERP-BEHAVIOR RELATIONSHIPS

Bohyun Park[1], Amanda Holbrook[1], Miranda Lutz[2], Scott Baldwin[3], Michael Larson[3], Peter Clayson[1]
[1]University of South Florida, [2]Erasmus University Rotterdam, [3]Brigham Young University

Performance monitoring is investigated using forced-choice response tasks, but the extent to which findings generalize across tasks is unclear. Relationships between event-related potential (ERP) indices of performance monitoring (error-related negativity [ERN], error positivity [Pe]) and behavior (response times [RTs], accuracy) are inconsistent across studies, possibly due to task-specific effects. This study investigated whether a

multiverse analysis might identify unique patterns in ERP-behavior relationships across tasks. We recorded ERPs from 180 healthy undergraduates (116 women) during three tasks: a modified Eriksen flanker task, a Stroop task, and a go/nogo task. Multilevel location-scale models examined how task-specific effects of previous-trial ERN and Pe on RTs and accuracy. Different task-specific effects were observed in ERN-RT and Pe-RT relationships. Larger previous-trial ERN predicted longer RT and greater accuracy during flanker and Stroop tasks but not go/nogo task. Larger previous-trial Pe predicted shorter and less variable RT on the Stroop and go/nogo tasks but not flanker task. These results suggest ERP-behavior relationships are moderated by task-specific cognitive demands rather than reflecting a universal mechanism. Given the absence of support for performance monitoring ERP-behavior relationships cutting across tasks, findings underscore the need to consider task-specific effects. A multiverse analysis is a valuable tool for rigorous, reproducible research.

INTERPLAY BETWEEN ERN AMPLITUDE, TRAIT NEUROTICISM, AND INTERNALIZING SYMPTOMS: CONTRASTING TASK SPECIFICITY VERSUS GENERALIZABILITY

Roslyn Harold[1], Kaylin Hill[2], Roma Kamat[1], Greg Perlman[3], Roman Kotov[3], Camilo J. Ruggero[4], Douglas B. Samuel[1], Daniel Foti[1]
[1]Purdue University, [2]University of Notre Dame, [3]Stony Brook University, [4]University of Texas at Dallas

The error-related negativity (ERN) has been consistently shown to correlate with and even predict onset of internalizing symptoms. However, most studies that investigate these clinical correlates use a single task to elicit the ERN and single method to score the ERN, when many potential tasks are available and decision points in quantifying the ERN are near-endless. In the current study, we aimed to investigate how ERN amplitude moderates the relationship between trait neuroticism and internalizing symptoms, while being thoughtful to these concerns. Thus, we use two different tasks to elicit the ERN and assessed the effects of interest using each task individually and as a composite. Further, we quantified the ERN using a standard difference-based score as well as a residualized score. We found that the ERNs elicited by the two tasks were only moderately correlated with one another (ΔERNs $r=.52$, $p<.01$; resid-ERNs $r=.55$, $p<.01$) and that the ΔERNcomposite and resid-ERNcomposite were highly correlated with one another ($r=.92$, $p<.01$). Further, we found that the results of the proposed clinical effects were highly generalizable across task and quantification method. Altogether, the generalizability of the observed effects across tasks suggests that the moderating effect of ERN amplitude on the neuroticism-internalizing relationship has to do with core processes of error monitoring that are shared across tasks rather than with the specific aspects of either task alone. Further, the generalizability across quantification method suggests that this effect is robust overall.

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***Symposium* IV-4**

WIRED FOR CONNECTION: PHYSIOLOGICAL SYNCHRONY AND SOCIAL REGULATION ACROSS THE LIFESPAN

Chair: Lisa Gistelinck
KU Leuven

Physiological synchrony plays a crucial role in self-regulation and social interaction, yet its developmental trajectory and contextual variations remain underexplored. This symposium will showcase a multidisciplinary investigation of physiological synchrony across key developmental stages, from infancy to adulthood, in diverse populations, including preterm and autistic children, and typically developing peers. Isil studies the heart rate variability (HRV) of infants with mothers who have varying levels of self-reported anxiety, using home-based ECG and proximity recordings to track mother-infant co-regulation. Lisa examines HRV in preterm versus full-term preschoolers during dyadic interactions, assessing the long-term impact of premature birth on autonomic nervous system function. Ruth explores how stress physiology and dyadic synchrony in autistic children differ from typically developing peers, assessing interventions such as oxytocin and sensorimotor synchronization training. Lastly, Fabiola investigates physiological synchrony of different measures in various social contexts, challenging the notion that synchronization inherently fosters affiliation. Together, these studies provide novel insights into the mechanisms of physiological synchrony across development, employing diverse methodologies (ECG, SCR, pupil mimicry) in both lab and naturalistic settings. By integrating perspectives from developmental psychology, psychophysiology, and social neuroscience, this symposium advances understanding of self-regulation and physiological synchrony from infancy to adulthood.

EXAMINING DUAL PHYSIOLOGICAL RESPONSES: INSIGHTS INTO HRV DIFFERENCES IN AUTISTIC CHILDREN

Ruth Op de Beeck[1], Laura Tibermont[1], Stephanie Van der Donck[1], Jean Steyaert[2], Kaat Alaerts[3], Bart Boets[1]
[1]Center for developmental Psychiatry, KU Leuven, [2]Child and Adolescent Psychiatry, UPC, Leuven, [3]Neuromodulation Laboratory, KU Leuven

Imagining a world without social interactions is impossible; each day, we engage with others. During these interactions, spontaneous alignment of physiological processes occurs, a phenomenon known as physiological synchrony. This refers to the temporal coordination of autonomic nervous system functions, such as heart rate (variability) (HRV) and skin conductance

responses (SCR). Physiological synchrony is believed to be crucial for effective social engagement. Research suggests that individuals with autism exhibit reduced physiological synchrony, potentially contributing to their social interaction challenges. Despite the centrality of social difficulties in autism, research on synchrony during real-world social interactions remains limited. The OXYSYNC-study addresses this gap by exploring physiological synchrony in autistic and typically developing children (8–12 years) during two-way real-life video-feed interactions with an experimenter. Using dual physiological recordings, we measure HR, HRV, and SCR across various interactive tasks, including free-viewing tasks and natural conversations. Additionally, we explore interventions to optimize synchrony, specifically focusing on the unique and combined effects of (1) a single-dose intranasal oxytocin administration, known for its prosocial and anxiolytic effects, and (2) a dyadic mirror game, which may improve social attunement. At the conference, we will share our findings on HRV differences between autistic and non-autistic children, offering insights into the mechanisms underlying social synchronization in autism.
FUNDING: FWO: Senior research project (G023923N)

EXPLORING THE NEXUS OF BEHAVIORAL MIMICRY AND PHYSIOLOGICAL SYNCHRONY IN DYADIC COOPERATION

Fabiola Diana[1], Ruud Hortensius[2], Mariska Kret[1]
[1]Leiden University, Institute of Psychology, [2]Utrecht University, Institute of Psychology

Our study investigated the relationship between trust and physiological synchrony in dyadic interactions, examining whether increased synchrony and behavioral mimicry enhance cooperation. 122 participants (61 dyads) engaged in a trust game under two conditions—face-to-face and face-block—with trust game roles (Trustor, Trustee) as a between-subject factor. We measured skin conductance (SC), heart rate (HR), pupil dilation, and facial expressions throughout the experiment. This novel approach clusters autonomic synchrony with motor mimicry to provide a holistic understanding of cooperation. We hypothesized that face-to-face scenarios would show increased synchrony and cooperation, measured by Windowed Lagged Cross-Correlation (WLCC). Surprisingly, condition had no significant effect on cooperation. As partially expected, HR synchrony positively predicted cooperation, while SC synchrony did not. Further analysis revealed a negative relationship between HR synchrony and Reciprocity, suggesting increased synchrony predicted lower Trustee reciprocity, but not Trustor risk-taking. This talk will discuss task intensity, trustor-trustee roles, trust computations, and present a network analysis showing complex interconnections between different types of mimicry (e.g., facial expressions, pupil dilation) and synchrony. This approach highlights how multiple physiological and behavioral signals combine to shape trust dynamics in real-time interactions.
FUNDING: This work was supported by the European Research Council (ERC) (starting grant no. 466804582) awarded to M.E.K.

WHAT HAPPENS TO AUTONOMIC AROUSAL AND CONTINGENCY TO NON-CRY VOCALISATIONS IN INFANT-CAREGIVER DYADS IF THE CAREGIVER HAS ELEVATED ANXIETY?

Isil Necef[1], Gio Esposito[1], Marta Perapoch Amado[1], James White[1], Emily Philips[1], Emily Greenwood[1], Pierre Labendzki[1], Narain Viswanathan[1], Tom Northrop[1], Katie Lancaster[1], Sam Wass[1]
[1]University of East London

Parent-infant interpersonal regulatory processes are related to physiological arousal states and vocalizations within the first year of life. Most co-regulation research has focused on infant cries, but atypical non-cry vocalizations are also highly associated with the development of certain neurodevelopmental psychopathologies. The extent to which infant co-regulation takes place during non-cry vocalisations is, however, not yet well understood. To address this, we collected day-long naturalistic biobehavioral recordings in home settings in N=46 caregiver-infant dyads (infants aged 9.6 ±4 months) using wearable devices including ECG, actigraphy and miniature microphones. We examined the association between caregiver anxiety (indexed from GAD-7), infant and caregiver autonomic arousal (indexed from ECG), and the acoustic properties of vocalizations (indexed from microphones). In contrast to previous findings that caregivers with high anxiety over-respond to infant distress, anxious caregivers were temporally less contingent to infant vocalization with lower pitch levels. Infants of caregivers with elevated anxiety also displayed moderately fewer non-cry vocalizations and increased heart rate around non-cry vocalizations. Additional analyses will examine changes in caregiver arousal around infant non-cry vocalizations. Our analyses suggest that atypical co-regulation during early child-caregiver interactions may drive atypical vocal development in dyads where the caregiver has elevated anxiety, with potential cascading effects on later language and other cognitive outcomes.
FUNDING: European Research Council project titled as "Oscillatory Neural and Autonomic Correlate's of Social Attendees" (ONACSA) The Scientific and Technological Research Council of Türkiye (Tübitak)

PHYSIOLOGICAL REGULATION IN PREMATURELY BORN PRESCHOOLERS: EXAMINING THE EFFECTS OF PERINATAL STRESS

Lisa Gistelinck[1], Rowena Van den Broeck[1], Maarten De Vos[1], Sam Wass[2], Gunnar Naulaers[3], Bart Boets[1]
[1]KU Leuven, [2]University of East Londen, [3]UZ Leuven

Each year, 15 million infants are born prematurely. While neonatal care advances have reduced mortality, morbidity remains high, affecting socio-emotional and neurological outcomes. Autonomic nervous system (ANS) dysregulation in preterm infants may stem from early-life stress and neurodevelopmental alterations, impacting cognitive and socio-emotional development. This study examined physiological regulation in 70 preterm preschoolers (5.5 years) and 32 full-term controls. Autonomic function was assessed via heart rate (HR, RMSSD, lnHF) during rest and interactive tasks. Associations were

analyzed between (1) physiological regulation at age five, (2) prematurity parameters (birth weight, gestational age), and (3) socio-emotional outcomes. Results showed no significant HR, RMSSD, or lnHF differences between groups, suggesting autonomic normalization in childhood for prematurely born children. However, a higher number of skin-breaking procedures during the Neonatal Intensive Care Unit stay correlated with lower HR and higher RMSSD/lnHF, suggesting accelerated ANS maturation due to early stress. No associations were found between autonomic function and birth weight or gestational age. Additionally, greater vagal tone in preterm children correlated with higher autism severity scores, suggesting a need for increased physiological adaptability to social challenges. Findings highlight ANS normalization by childhood and the potential impact of early stress on ANS maturation, informing future research on preterm development and support strategies.
FUNDING: This study is funded by FWO Research Grant G0C9521N.

***Symposium* V-1**

FROM THE MICROSYSTEM TO THE EXOSYSTEM: ECOLOGICAL INFLUENCES ON NEURODEVELOPMENT ACROSS INFANCY, CHILDHOOD, AND ADOLESCENCE

Chair: Aislinn Sandre[1]; Co-Chair: Kaylin Hill[2]; Discussant: Lisa Gatzke-Kopp[3]
Western University[1], University of Notre Dame[2], Pennsylvania State University[3]

Human development occurs within the context of multiple ecological systems, from proximal microsystems (e.g., family) to distal exosystems (e.g., economic policies). These systems shape developmental trajectories and lifelong health outcomes, possibly through their influence on the developing brain. This symposium brings together research spanning infancy, childhood, and adolescence to examine how multiple ecological contexts influence neurodevelopment, with a focus on the neural correlates of emotion, reward, and cognition. Lara Pierce will show that maternal stress and education are linked to differences in infant neurodevelopment across visual processing, auditory statistical learning, and global cortical maturation. Aislinn Sandre will present findings showing that prenatal family income predicts developmental trajectories of resting brain activity during infancy and will discuss the effects of a poverty reduction intervention on children's neural responses to speech sounds. JungWon Choi will present data suggesting maternal negativity is prospectively associated with infant inhibitory control. Kaylin Hill will demonstrate how early parenting is associated with developmental trajectories of reward responsiveness from late childhood through adolescence. Discussant Lisa Gatzke-Kopp will highlight points of convergence across these studies and their implications. Together, this research underscores the promise of an ecological approach to advancing our understanding of how early experiences shape the developing brain.

ASSOCIATIONS BETWEEN SES, CAREGIVER INTERACTIONS, AND DEVELOPMENT OF NEURAL PROCESSES DURING INFANCY

Lara Pierce[1], Charles Nelson[2], Ana Badal[1]
[1]York University, [2]Boston Children's Hospital/Harvard Medical School

Mechanisms by which experiences within a low-SES context shape distinct neural processes are not well understood. In two longitudinal low- to mid-SES infant cohorts (Cohort 1: n=104; Cohort 2: n=116; 2-36 months) we have tested associations between SES and stress, caregiver-child interactions, and distinct measures of infant neurodevelopment using electroencephalography (EEG). We find: 1) Maternal perceived stress (PSS) predicts P2 amplitude in an auditory statistical learning task at 26-months (Pierce et al., 2021), and N2 amplitude by 36-months ($r = .604$, $p = .038$). Variation may be partly driven by caregiver-child joint attention interactions; 2) Maternal education predicts longitudinal EEG gamma power trajectories identified using Latent Profile Analysis (LPA) from 2-12 months ($b = .64$, $p = .047$); and 3) Maternal education and early life stress independently predict quality of engagement in joint attention ($b = .76$, $p < .05$), and infant alpha ($b = .007$, $p < .05$) and theta ($b = -.010$, $p < .05$) power at 24 months. Quantity of engagement in joint attention also moderated associations between early life stress and theta power at 36 months, suggesting that engagement in joint attention may be neurodevelopmentally protective. Associations between early life stress, joint attention, and alpha functional connectivity are being tested. Results suggest that SES-related variables uniquely predict neural processes both at rest and during language-specific tasks and facilitate efforts to mechanistically connect early experience with downstream developmental outcomes.
FUNDING: JPB Foundation; Jacobs; NSERC

FAMILY SOCIOECONOMIC DISADVANTAGE AND EARLY CHILDHOOD BRAIN DEVELOPMENT

Aislinn Sandre[1], Sonya V. Troller-Renfree[2], Katherine Magnuson[3], Lisa A. Gennetian[4], Hirokazu Yoshikawa[5], Sarah Halpern-Meekin[3], Nathan Fox[6], Kimberly G. Noble[2]
[1]Western University, [2]Teachers College, Columbia University, [3]University of Wisconsin - Madison, [4]Duke University, [5]New York University, [6]University of Maryland,

Family socioeconomic disadvantage is linked to disparities in children's development and health, possibly through adaptations in the development of brain function. However, it remains unclear how early in development socioeconomic disadvantage shapes trajectories of brain function or the extent to which interventions that reduce disadvantage can alter children's brain function. This talk will explore the effects of prenatal socioeconomic disadvantage and a poverty reduction intervention on brain function, with a focus on resting electroencephalography (EEG) power in infants and the mismatch response (MMR) to speech sounds in children. In Study 1, I will present data from a longitudinal sample of 165 infants, showing that lower prenatal family income is associated with differences in the developmental trajectories of theta and beta power from 1 to 18 months of

age. In Study 2, I will discuss the Baby's First Years study, a randomized control trial of a monthly unconditional cash transfer in which 1,000 low-income mothers were randomized shortly after birth to receive either a high ($333) or low ($20) monthly unconditional cash gift for the first several years of their child's life. I will present data from a subsample of 475 four-year-old children, showing no statistically detectable impact of the high cash gift on the magnitude of the MMR. Taken together, these results suggest prenatal socioeconomic disadvantage may shape trajectories of brain function in infancy. Potential explanations for the null MMR effects will be discussed.

FUNDING: This research was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (R01HD087384 and R01HD093707) and the Canadian Institutes of Health Research Fellowship (187925). Additional support was provided by the US Department of Health and Human Services, Office of Planning, Research and Evaluation; Andrew and Julie Klingenstein Family Fund; Annie E. Casey Foundation; Arnold Ventures; Arrow Impact; BCBS of Louisiana Foundation; Bezos Family Foundation, Bill and Melinda Gates Foundation; Bill Hammack and Janice Parmelee, Brady Education Fund; Chan Zuckerberg Initiative (Silicon Valley Community Foundation); Charles and Lynn Schusterman Family Philanthropies; Child Welfare Fund; Esther A. and Joseph Klingenstein Fund; Ford Foundation; Greater New Orleans Foundation; Heising-Simons Foundation; Holland Foundation; Jacobs Foundation; JPB Foundation; J-PAL North America; Lozier Foundation; NYC Mayor's Office for Economic Opportunity; Office of Behavioral and Social Sciences Research-Office of the Director, NIH; Perigee Fund; Robert Wood Johnson Foundation; Robin Hood Foundation; Sherwood Foundation; Valhalla Foundation; Weitz Family Foundation; W.K. Kellogg Foundation; and three anonymous donors.

THE N2 DURING PRESCHOOL: TEMPORAL STABILITY AND A TEST OF BIDIRECTIONAL EFFECTS WITH MATERNAL EMOTION CHARACTERISTICS

JungWon Choi, Anahid Akbaryan, Reese Burkey, Peter Ramirez, Ashley Walker, Sejal Mistry-Patel, Jennifer Kling, Rebecca Brooker
Texas A&M University

Inhibitory control, an early component of temperament, refers to ability to self-regulate behaviors through the volitional suppression of prepotent actions. During preschool, inhibitory control improves markedly, but its neurodevelopmental underpinnings remain unclear. Moreover, focusing only on observed behavior limits our understanding of how maternal emotions shape these neural processes. This study examined the stability of N2, a neural marker of inhibitory control, across preschool years and its bidirectional links with maternal emotion characteristics. A total of 121 preschoolers (59% girls, predominately White) completed EEG assessments during a Go/no-go task at ages 3, 4, and 5. Mothers reported their negative emotions (PANAS-X) and anxiety symptoms (GADQ, SIAS, PSWQ). Structural equation modeling tested stability and bidirectional effects between child N2 and maternal characteristics over time.

Results showed stable N2 amplitudes across ages 3 to 5 (β = .40-.43, $p < .05$). Child N2 did not predict maternal characteristics at subsequent assessment. Similarly, maternal anxiety symptoms did not predict subsequent child N2. However, greater maternal negativity at age 3 predicted smaller N2 at age 4 ($\beta = .14$, $p < .05$) and negativity at age 4 predicted smaller N2 at age 5 ($\beta = .40$, $p < .05$).

Findings provide initial evidence for mother-to-child, but not child-to-mother effects linking the neural correlates of N2 with maternal emotion characteristics and a foundation for future longitudinal work on developing neural correlates of inhibitory control in preschoolers.

FUNDING: Data collection for this project was supported by K01MH100240 from the National Institute of Mental Health. Infrastructure support was provided by P20GM103474 from the National Institute of General Medical Sciences. Work on data analysis and the preparation of this article was supported by R01MH113669.

EARLY EXPERIENCES ASSOCIATED WITH DEVELOPMENTAL TRAJECTORIES OF NEURAL REWARD RESPONSIVENESS FROM LATE CHILDHOOD THROUGH ADOLESCENCE

Kaylin Hill[1], Christian Bean[2], George Abitante[2], Aline Szenczy[3], Connor Lawhead[3], Ellen Kessel[3], Greg Hajcak[4], Brady Nelson[3], Daniel Klein[3], Autumn Kujawa[2]
[1]University of Notre Dame, [2]Vanderbilt University, [3]Stony Brook University, [4]Santa Clara University

Altered reward responses are implicated in a range of psychopathology, most notably depression. Low reward responsiveness is associated with prospective vulnerability and current symptoms of depression. Reward responsiveness is expected to increase from childhood to adolescence and then decrease into adulthood, though how reward trajectories develop is not well understood. Early parenting and stress exposure may be key ecological predictors that influence developmental processes. In this study, we investigated ecological predictors of reward developmental trajectories in a longitudinal sample (N=364). Parent–child interactions were observed at age 3 and stress was measured via structured interviews ages 0-9. The monetary reward positivity (RewP), a neural indicator of reward responsiveness, was measured at ages 9, 12, 15, and 18. We observed a curvilinear growth trajectory such that the RewP increased from childhood to adolescence (b=1.8, p<.001) and decreased from adolescence to young adulthood (b=-.66, p<.001). Higher levels of negative parenting related to lower increase in RewP over time (b=-.54, p=.036) and weaker drop-off later (b=.20, p=.023); lower levels of positive parenting were similarly associated with curvilinear effect of time on RewP though not significant (p=.085). Stress did not significantly predict RewP trajectories (ps<.320) or mean RewP (b=-.10, p=.119). Together, results support proposed RewP developmental trajectory from childhood to young adulthood and suggest a link between early parenting and RewP development across the first 18 years of life.

FUNDING: This project was supported by National Institute of Mental Health Grant R01 MH069942; KEH was supported in part by K23MH131753.

ADVANCES IN THE ANALYSIS OF OSCILLATORY BRAIN ACTIVITY

Chair: Henrico Stam
Erasmus University Rotterdam

Oscillatory phenomena are central to neural time series, such as EEG recordings. A longstanding debate exists around measuring, classifying, and interpreting brain oscillations, including defining what constitutes an oscillation and how to measure it accurately. The symposium seeks to advance this debate and features the following presentations: Dr. Keil explores how computational models, simulations, and time series analyses can address challenges in interpreting oscillatory activity beyond the power spectrum. These methods allow for characterizing neural events on a continuum from phase-locked to non-phase-locked. Cellier emphasizes the need to correct aperiodic activity in EEG analyses, particularly in studies of event-related oscillations in cognitive control. FOOOF parameter choices are discussed in the context of a working memory study. Dr. Davies investigates developmental changes in auditory processing through wavelet transforms, focusing on the effect of age on gamma and beta oscillations during an auditory novelty oddball task. Dolge examines how error monitoring in OCD patients relates to altered theta and delta power, showing increased theta and reduced delta power differences. Finally, Stam compares various time-frequency analysis techniques, such as Wavelets, FFT, ERSP, and PCA, to assess their strengths and limitations in studying brain oscillations while also exploring the relationship between oscillations and ERPs, particularly in error monitoring.

EVOKED, INDUCED, CONFUSED? CHARACTERIZING OSCILLATORY PHENOMENA IN NEURAL TIME SERIES

Andreas Keil, Laura Ahumada, Sarah Gardy, Jourdan Pouliot, Anna-Lena Tebbe, Andrew Farkas
University of Florida

Oscillatory phenomena are a salient feature of neural time series, including human EEG and MEG recordings. Throughout the history of electrophysiology however, a vigorous debate has accompanied developments in measurement, classification, and interpretation of brain oscillations. These include fundamental issues such as what constitutes an oscillation, and what types of oscillations exist. They also include more technical questions regarding appropriate measurement of oscillatory activity. In this presentation, we will discuss how problems in measuring and interpreting brain oscillations may be addressed by simulations, computational models, and advanced time series analyses. We will also discuss the benefits of thinking about oscillatory activity beyond what is given in the power spectrum. This includes using the signal's phase, phase stability, duration, and waveform shape. Time series analysis tools for enabling these characterizations will be presented along with examples of simple simulations, which allow testing of assumptions underlying the interpretation of spectral measurements. These simulations help researchers characterize types of neural events on a continuum between clearly oscillatory to clearly non-oscillatory, and along dimensions ranging from phase-locked (evoked) to non-phase-locked (induced). They also enable a better understanding of what is being represented in frequency-domain and time-frequency-domain analyses, which are increasingly used in psychophysiological research.
FUNDING: NIMH

APERIODIC MODELING FOR ANALYSES OF EVENT-RELATED OSCILLATIONS

Dillan Cellier, Bradley Voytek, Quirine van Engen
University of California, San Diego

Analyses of event-related oscillations are the benchmark of a wide array of EEG studies on cognitive control, including those focused on working memory, attention, and perception. However, traditional methods for quantifying oscillations suffer from the confounding influence of aperiodic, or arrhythmic neural activity. Our presentation will highlight why correcting for aperiodic activity is an imperative methodological step in EEG analyses, new methods for quantifying aperiodic activity, and the practical challenges presented by the commonly short time windows of task EEG data. Specifically, Spectral Parameterization (SpecParam, also commonly referred to as FOOOF) is an open-source, Python-based tool which attempts to disambiguate the oscillatory and aperiodic components of EEG power spectra. While SpecParam presents one solution to the problem of modeling aperiodic activity, it also requires careful tuning to the particulars of a given EEG dataset. We will outline the high-level modeling decisions that researchers seeking to apply SpecParam to their data might consider. These include the frequency range to fit, the number of oscillations that should be included in the model, and how to use SpecParam outputs to compare between pre- and post-stimulus task periods. We will demonstrate each of these decision points using an example dataset of EEG data from a working memory study[1]. We will also highlight the potential implications of aperiodic-correction for the ultimate theoretical takeaways of event-related analyses of neural oscillations. [1. Adam et al. (2018). JoCN]
FUNDING: NIH National Institute of General Medical Sciences grant R01GM134363-01 (to B.V.). NSF GRFP grant (to D.C.).

USING MORLET WAVELETS TO MEASURE BRAIN ACTIVITY IN CONCERT WITH TRADITIONAL ERP APPROACHES MAY BETTER ELUCIDATE THE MATURATION OF BRAIN PROCESSING

Patricia Davies, Kyle Wilhelm, William Gavin
Colorado State University

Research has revealed developmental changes in processing tones during a novelty oddball paradigm in both ERP (e.g., Mingils et al, 2023) and time frequency (TF) analyzes (e.g., Morales et al., 2023; Wienke et al., 2018). The predictive coding model asserts that cascading and bidirectional communication across multiple levels of the cortex builds models of sources and context for incoming sensory input to predict future sensory

occurrences (Clark, 2013). This study examines changes in predictive coding across development using wavelet transformations. Evoked power and phase-locking factor (PLF) were measured in 204 individuals, ages 7 to 25 years, for regions of interest (ROI) in frequent, target, and novel tones of an auditory novelty oddball task. Multiple regression analyses assessed the effect of Age, Sex and AgexSex on early gamma and beta ROIs after controlling for PLF. Oscillations in the early sensory time frame of P1/N1 in two ROIs (1) gamma related to P1 (34-64 ms/35-47 Hz) and (2) beta related to N1 (92-124 ms/17-20 Hz) revealed significant age effects for all three tones ($p<.001$) accounting for 58-72% of the variance.In addition, after the early sensory phase, the TF analyses also show multiple gamma-beta shifts in younger children that decrease both in number and evoked power with increasing age. These maturational changes in gamma-beta shifts during processing of stimuli may represent cascading bidirectional communication as the young children develop models for predicting future occurrences of the various stimuli in the novelty oddball paradigm.
FUNDING: NIH/NCMRR (K01 HD001201) to PLD

ALTERED THETA AND DELTA DYNAMICS DURING PERFORMANCE MONITORING IN OCD PATIENTS: TASK FOCUS PLAYS AN IMPORTANT ROLE

Alexander Dolge[1], Julia Klawohn[2], Anja Riesel[1]
[1]University of Hamburg, [2]MSB Medical School Berlin

The ability to detect errors and to adequately adjust the behavior accordingly to avoid future errors is fundamental to successful adaptation in changing and complex environments. Errors lead to a burst in theta power in EEG oscillations. It has been proposed that theta represents a mechanism that mediates the need for cognitive control over prefrontal brain regions. Error processing and theta but also delta power have been repeatedly shown to be altered in OCD patients. In addition, OCD patients show reduced flexible adjustments in error monitoring under speed and accuracy instructions. However, it remains unclear to what extent these changes are associated with altered frequency dynamics. Therefore, the aim of this project is to reanalyze EEG data on error monitoring and instruction-dependent adjustments in OCD patients collected in a previous study (Riesel et al., 2019, Journal of Abnormal Psychology, 128 (7)). Data from 25 healthy participants and 24 patients with OCD were analyzed using time-frequency analysis (complex Morlet wavelet convolution) and frequency coupling analysis. The results indicate an overall increase in theta power and smaller delta power differences between speed and accuracy conditions in OCD patients following errors. The results of theta and delta frequency coupling give reason to assume that functional connectivity between medial and lateral prefrontal cortex is less adaptive in OCD patients. Furthermore, this supports the hypothesis that cognitive control is altered and the flexibility of performance monitoring is reduced in OCD patients.
FUNDING: Data collection was funded by the DFG (German Research Foundation), Grant KA815/7-1. This project is funded by DFG Grant RI2853/2-2.

TIME-FREQUENCY ANALYSIS: COMPARATIVE EXPLORATION OF METHODS IN ERROR MONITORING

Henrico Stam[1], William Gavin[2], Dillan Cellier[3], Jens Bernhardsson[4], Germano Gallicchio[5], Frederik van der Veen[1], Andreas Keil[6]
[1]Erasmus University Rotterdam, [2]Colorado State University, [3]University of California, San Diego, [4]Mid Sweden University, [5]Bangor University, [6]University of Florida

This study aims to compare various methods and measures of time-frequency analysis, with a focus on identifying both the similarities and differences between approaches. By conducting a systematic comparison, the study seeks to guide researchers in selecting the most appropriate methods for analyzing oscillatory activity. The time-frequency analysis techniques examined include wavelets, FFT, FOOOF, event-related spectral perturbation (ERSP), and time-frequency principal component analysis (PCA), all applied to a shared dataset. This dataset, derived from a previous study by Lin et al. (2020), includes data from 36 adults who performed a flanker task across two sessions. The study will evaluate the strengths and limitations of each technique, with key outcome measures including oscillatory power (delta, theta, and alpha bands) and phase-locking value. Additionally, test-retest reliability will be assessed. The findings will be interpreted in light of their theoretical implications for error-monitoring, specifically exploring the relationship between brain oscillations and event-related potentials (ERPs), such as the ERN and Pe. This research is a collaborative effort within the SPR working group on event-related brain oscillations (SPREO).

Symposium V-3

THE DYNAMICS OF THREAT AND SAFETY LEARNING: INFLUENCES OF INDIVIDUAL DIFFERENCES AND CONTEXTUAL FACTORS

Chair: Yannik Stegmann
University of Würzburg

Learning is a fundamental aspect of human cognition that is crucial for adaptation and wellbeing. While the basic mechanics of learning are understood, it is also true that learning is a dynamic process involved in the coordination of physiological systems varying across individuals and contexts. This symposium explores these dynamic and contextual systems to achieve more specificity of learning and adaptation. Andreatta will explore the mechanisms of safety learning, demonstrating that conditioned startle potentiation was distinctly inhibited by cues predicting the absence of threat but not by those signaling threat relief. Stegmann et al., will demonstrate the relationship between electrocortical responses and explicit threat learning in the context of threat avoidance, revealing a distinct response pattern linked to memory encoding. Farkas et al., will detail how multilevel Bayesian learning modeling more effectively captures generalized aversive conditioning of ssVEP recordings during simultaneous fMRI acquisition. Moving to a psychopathological

context, Bianco et al., will examine how maladaptive threat and safety learning mechanisms contribute to chronic tinnitus distress, using magnetoencephalography during an aversive generalization and threat regulation task. Together, this symposium highlights how threat and safety learning influences cortical, physiological, and behavioral responses while also demonstrating how these effects are shaped by individual differences and contextual factors—insights that are particularly relevant for understanding psychopathology.

DISENTANGLING SAFETY: A SUMMATION TEST BETWEEN ABSENCE AND TERMINATION OF THREAT

Marta Andreatta
University Hospital Tuebingen

Safety has been defined as the absence of threat and stimuli never associated with an aversive event (unconditioned stimulus, US) can inhibit conditioned defensive responses. Relief is a positive response elicited by the termination of an aversive US and stimuli presented upon the moment of relief elicit appetitive responses. Unclear remains whether the threat absence and threat termination share inhibitory mechanisms or rather these two types of safety are distinct. Fifty-eight participants learned that one stimulus (threat-CS) was shortly presented before a mildly painful electric stimulation (US), one stimulus (relief-CS) was presented shortly after the US, and one stimulus (safety-CS) was never associated with the US. During a summation test, threat-CS was presented in compound with either the relief-CS or the safety-CS. Conditioned defensive responses were successfully acquired on both verbal and physiological responses meaning that threat-CS compared to both safety-CS and relief-CS was rated more aversive and elicited startle potentiation. During summation test, conditioned physiological defensive responses were significantly and comparably attenuated by both safety-CS and relief-CS. However, inhibition of the threat-elicited startle potentiation by the relief-CS was not evident during the early test trials. In summary, conditioned defensive responses can be inhibited by signals of threat absence (safety-CS) and threat termination (relief-CS). However, the underlying mechanisms of these two signals may differ.
FUNDING: German Research Foundation (HE: AN 957/4-1) and the Collaborative Research Center "Fear, Anxiety, Anxiety Disorders" SFB-TRR 58 projects B08

ELECTROCORTICAL CORRELATES OF MEMORY AND ATTENTION DURING THE ANTICIPATION OF AVOIDABLE AND INEVITABLE THREATS

Yannik Stegmann, Matthias Gamer
University of Würzburg

When faced with danger, humans exhibit a range of defensive behaviors, including freezing and active avoidance. Previous research has identified a distinct pattern of physiological responses to avoidable threats, characterized by heart rate bradycardia, reduced visual exploration, and suppressed visual alpha activity (8–13 Hz). This pattern suggests an adaptive state of attentive immobility. However, the relationship between this state and the encoding of threat and safety memories remains largely unexplored. To address this, we recorded parieto-occipital alpha activity, eye movements, and autonomic responses in 60 human participants as they awaited either an avoidable, inevitable, or no threat. To examine memory effects, participants later completed a subsequent memory task. Results showed enhanced suppression of alpha activity during avoidable threats, accompanied by heart rate bradycardia, centralized gaze, and increased sympathetic arousal—hallmarks of attentive immobility. However, these responses were not linked to memory encoding. Instead, memory effects were associated with reduced pupillary responses and decreased alpha activity, particularly in occipito-temporal regions. Together, these findings suggest that when individuals face avoidable threats, they enter a state of attentive immobility that enhances perceptual processing and prepares them for action but does not extend to improved memory encoding.

ROBUST SINGLE-TRIAL ESTIMATES OF GENERALIZED AVERSIVE CONDITIONING: AN ANALYSIS OF SIMULTANEOUSLY RECORDED EEG AND fMRI

Andrew Farkas, Judith Cediel, Faith Gilbert, Hannah Engle, Mingzhou Ding, Andreas Keil
University of Florida

The overgeneralization of defensive responses to neutral cues is associated with anxiety and fear disorders, but the neurophysiology involved in this process are not well understood. Simultaneous EEG-fMRI recordings during generalization conditioning paradigms could offer unique insights by combining the complementary strengths of the two neuroimaging methods. However, learning is a dynamic process that can vary between individuals, and thus its effects can be difficult to quantify because of missing observations and noise at the single-trial level. These issues can be addressed by Bayesian multilevel modeling. In this presentation, the modeling approach is leveraged for obtaining reliable single-trial estimates of brain activity while controlling for participant-level differences in adaptation and learning rates. Despite increased complexity, the multilevel structure improved cross-validation accuracy compared to simpler models and improved the recovery of aversive generalization effects. Lastly, missing trials were replaced by Bayesian imputation, where the trial is treated as another parameter to be estimated. The entire model's structure is used to fill in missing trials with estimated samples. The imputed trials contribute less to model fitting, but allow for more participants and trials to be used in the analyses, increasing statistical power and external validity. We conclude by showing how this improved granularity allows for insights into individual participants, trials, and brain regions that are selectively engaged during generalized aversive conditioning.
FUNDING: R01MH125615-01A1

MALADAPTIVE THREAT AND SAFETY LEARNING IN TINNITUS: NEURAL MECHANISMS OF AVERSIVE GENERALIZATION AND THREAT REGULATION

Riccardo Bianco[1], Alejandro Espino-Payá[1], Cosima Lukas[2], Christian Dobel[2], Joachim Gross[1], Markus Junghöfer[1]
[1]University of Münster, Germany, [2]Jena University Hospital, Friedrich-Schiller-University Jena, Germany

In the context of threat and safety learning dynamics in psychopathology, our study examines how tinnitus shapes aversive and safety learning processes. Classical conditioning, as a neurophysiological model of tinnitus distress, suggests that the phantom sound becomes implicitly associated with an aversive emotional state, a framework that underlies interventions like Tinnitus Retraining Therapy. We hypothesized that tinnitus patients would demonstrate an overgeneralization of aversive responses and reduced threat inhibition—particularly in prefrontal regions (vmPFC, dlPFC)—compared to healthy controls. To test this, both tinnitus patients and healthy controls participated in an auditory conditioning paradigm where a low-frequency (700 Hz) or high-frequency (1000 Hz) tone (CS+) was paired with an aversive stimulus (US), while the alternate tone (CS-) served as a safety signal. Additionally, seven generalization stimuli spanning the frequency continuum between CS- and CS+ were presented to capture the dynamic nature of threat generalization. Neural responses recorded using magnetoencephalography (MEG) alongside explicit subjective ratings, revealed that although both groups exhibited generalization effects, tinnitus patients showed an inversion in neural prefrontal activation gradients. This suggests a disruption in the normal inhibitory processes that coordinate attentional, perceptual and psychophysiological processes during learning, possibly contributing to the heightened emotional distress observed in tinnitus patients.
FUNDING: German Research Foundation (JU 445/10-3; GR 2024/10-3); Interdisciplinary Centre for Clinical Research (IZKF) Münster (JU3/001/24)

***Symposium* V-4**

BIG IDEA: PRECISION PSYCHOPHYSIOLOGY AND MULTIMODAL BIOMARKERS

Chair: Annmarie MacNamara
Texas A&M University

This Big Idea symposium highlights cutting edge work that uses a multi-method psychophysiological approach to uncover findings that are not evident using a single method alone. First, we examine how multi-day and multi-modal bio-physiological signals improve the prediction of cognitive workload across three tasks. Next, we learn how multimodal fusion of brain MRI data —task-fMRI contrasts, functional connectivity during tasks and rest, structural MRI, and diffusion MRI—into one model can improve out-of-sample prediction and test-retest reliability of cognitive function. This is followed by work showing that fMRI-based longitudinal prediction of increased fear symptoms in a clinical sample is improved when combined with momentary assessment of affective inertia, again underlining the unique predictive power of multiple measures. Finally, we learn about a multimethod approach to identifying the most meaningful candidate predictors (from 7 experiential, 6 behavioral, and 2 contextual EMA variables, with 7 physiological metrics) for predicting momentary suicidal tendencies in autistic adults. Overall, these presentations showcase how multimethod approaches can be used to reveal novel basic science and clinical insights.

TOWARD BUILDING PRECISION NEUROIMAGING BIOMARKERS FOR COGNITIVE FUNCTIONING VIA MULTIMODAL FUSION

Narun Pat
University of Otago

The NIMH Research Domain Criteria (RDoC) treats cognitive functioning as a functional domain for psychopathology across diagnoses. Specifically, RDoC stipulates that the relationship between cognition and mental health is manifested across neurobiological units of analysis, from the brain to genes. However, recent research has questioned the ability of brain MRI to robustly capture individual differences in cognition, challenging its potential use as a neuroimaging biomarker for RDoC's cognitive functioning. To address this, we proposed using machine learning to fuse brain MRI data across modalities—task-fMRI contrasts, functional connectivity during tasks and rest, structural MRI, and diffusion MRI—into one prediction model. Using various large-scale datasets across the lifespan (ages 22–100), we found that multimodal fusion consistently improves the psychometric properties of brain MRI in capturing cognition in several aspects: 1) predictive ability, or creating out-of-sample predictions of individuals' cognition based on their brain MRI (up to around $r = .6$), and 2) test-retest reliability, or making consistent predictions over time (ICC > .75). We then tested the utility of this method in explaining the relationship between cognition and mental health. Using Adolescent Brain Cognitive Development Study, we found that neuroimaging accounted for 66% of the relationship between cognition and mental health, compared to 21% by polygenic scores. Accordingly, multimodal fusion appears to be a viable approach to building neuroimaging biomarkers for RDoC's cognitive functioning.
FUNDING: New Zealand Health Research Council Funding (grant numbers 21/618 and 24/838), Neurological Foundation of New Zealand (grant number 2350 PRG)
The University of Otago

EMOTIONAL INFLEXIBILITY AND REACTIVITY AS RISK FACTORS FOR FEAR-RELATED SYMPTOMATOLOGY: A COMBINED EMA AND FMRI STUDY

Ha Jeong Park, Annmarie MacNamara
Texas A&M University

Affective inertia, the tendency for one's affective state to persist, may play a role in the maintenance and worsening of internalizing symptoms. In addition, heightened amygdala activation may predict worsening psychopathology. Combining measures

of daily affect and fMRI BOLD may yield new insight that is not possible using one measure alone. Here, we examined whether positive and/or negative affect (PA and NA) inertia would moderate the prospective association between amygdala activation and internalizing symptoms one year later. In Year 1, a mixed internalizing sample (n = 76) completed a passive picture-viewing task during fMRI, followed by 10 days of ecological momentary assessment (EMA) of daily affect. Self-reported internalizing symptoms were assessed at Year 1 and Year 2, yielding three underlying components: Distress, Fear, and OCD. PA/NA inertia were estimated using multilevel modeling of EMA, and amygdala activation was extracted for Positive > Neutral and Negative > Neutral pictures. Amygdala activation, affective inertia, and their interaction were entered as predictors of Year 2 internalizing dimensions, separately for PA/NA. Heightened amygdala activation and higher PA/NA inertia in Year 1 predicted greater increases in Year 2 Fear symptoms (NA X amygdala, $\beta = .254$, $p = .006$; PA X amygdala, $\beta = .190$, $p = .018$; main effect of amygdala, $\beta s > .173$, $ps < .03$); no effects for other symptom dimensions. As such, emotional inflexibility, paired with stronger neural reactivity to emotional stimuli, may be a risk factor for developing worse fear-related symptoms.
FUNDING: NIMH R01MH125083

PREDICTING MOMENTARY SUICIDALITY IN AUTISTIC ADULTS WITH EXPERIENTIAL, BEHAVIORAL, PSYCHOPHYSIOLOGICAL AND CONTEXTUAL METRICS

Lauren Bylsma, Xin Hu, Jacob Feldman, Caitlin Conner, Carla Mazefsky, Lori Scott
University of Pittsburgh

We aimed to utilize multimodal dynamic measures in daily life to identify the strongest proximal risk and protective factors for intraindividual fluctuations in suicide risk among autistic adults. Autistic participants (N=85, Mage = 30.7, 56 female) in an ongoing study completed a 14-day ecological momentary assessment (EMA, 8 prompts/day) with continuous recording of electrocardiogram (heart rate, HR; high frequency heart rate variability, HF-HRV), electrodermal activity (EDA), and accelerometry. Candidate predictors included 7 experiential, 6 behavioral, and 2 contextual EMA variables, with 7 physiological metrics derived from the 30-min window preceding each prompt. We trained 3 random forest regression models to predict momentary reports of desire to live, desire to die, and desire to kill oneself. 5-fold cross-validation yielded R^2 values of .44-.47. We identified the top 15 predictors from each model and derived an intersection of 11 shared variables to be included in linear mixed-effects models, with biological sex and age as covariates. The strongest predictors for each model were: (1) Desire to live: feeling emotionally numb (-), negative affect (NA)(-), and HR (+) ($ps<.001$); (2) Desire to die: NA (+), feeling emotionally numb (+), and agitation/restlessness (+) ($ps<.001$); and (3) Desire to kill oneself: NA (+) and HF-HRV(-) ($ps<.001$). Findings highlight feeling emotionally numb and NA as reliable subjective markers of suicidality and HF-HRV (a measure of parasympathetic activity) as promising biomarkers for real-world suicide risk prediction among autistic adults.
FUNDING: NIH P50MH130957

5TH ANNUAL PRESIDENT'S SYMPOSIUM ON DIVERSITY, EQUITY, AND REPRESENTATION ADVANCING EQUITY IN PSYCHOPHYSIOLOGY ACROSS THE RESEARCH PIPELINE

Chair: Christine Larson[1]; Co-Chair: Kate Webb[2]
[1]University of Wisconsin, Milwaukee, [2]Duke University Medical Center

Psychophysiological research continues to generate important insights into brain-behavior associations, but longstanding methodological and conceptual conventions risk reinforcing inequities and limiting the generalizability of findings. Across the research pipeline, methods for data collection, study design, and interpretation may unintentionally perpetuate biases. This symposium highlights pioneering work that addresses these challenges through inclusive methods, nuanced assessment of population-level stressors, and critical communication and use of race and ethnicity in psychophysiological research. Talks will present advances in equitable data acquisition strategies, considerations for inclusive study design, and analytic frameworks for more nuanced interpretation of individual differences in stressors and experiences. Collectively, this work underscores the importance of moving toward approaches that recognize structural and contextual influences on psychophysiological processes. This symposium seeks to encourage reflection on conventional research practices, strengthen scientific rigor, and advance equitable psychophysiological research.

"WE CONTROLLED FOR RACE AND ETHNICITY..." CHALLENGING AND UNPACKING CONVENTIONS ON THE USE AND COMMUNICATION OF RACE AND ETHNICITY IN PSYCHOPHYSIOLOGICAL RESEARCH

Carlos Cardenas-Iniguez
University of Southern California

Researchers often include race and ethnicity as covariates in statistical models—commonly framed as "controlling for" these variables to isolate presumed biological or psychological mechanisms. However, this routine practice is rarely interrogated for its conceptual implications or methodological consequences. This talk examines the assumptions embedded in "controlling for race and ethnicity," especially when treated as nuisance variables or proxies for unmeasured social factors. Drawing from critical scholarship in public health, sociology, and psychology, I will discuss how these analytic choices often obscure the role of structural racism in shaping both physiological processes and the environments in which individuals develop. I will highlight how default practices can reinforce biological essentialism, erase sociopolitical context, and hinder efforts to understand population-level inequities in psychophysiological outcomes. Concrete alternatives will be presented, including strategies for modeling race and ethnicity as social exposures, linking structural determinants of health (e.g., residential segregation, environmental racism) to physiological outcomes, and designing studies that advance equity-informed science. Attendees will leave with practical tools and conceptual frameworks to engage more ethically and rigorously with social categories in psychophysiological research.

COLLECTING EEG AND fNIRS DATA IN INDIVIDUALS WITH MELANATED SKIN AND COARSE AND CURLY HAIR

Keanan Joyner
University of California, Berkeley

Electroencephalogram (EEG) and functional near infrared spectroscopy (fNIRS) technology suffers from "technical racism" – that is, while the hardware was not intentionally designed to exclude groups of individuals based on phenotypic characteristics associated with a given race, each technology struggles to accommodate individuals with darker skin and hair, or coarser and curlier hair, for different reasons per technology. As a result, individuals with these hair types and skin and hair color, most commonly Black individuals, are severely underrepresented in EEG and fNIRS research (Bradford et al., 2023). The current work presents empirical data from two studies, one EEG and one fNIRS, speaking to considerations for collecting data using these technologies. The EEG study developed a protocol designed to be able to collect sufficient quality data from individuals who identify as Black and have coarser and curlier hair that can be taught to RAs without prior cosmetology experience from multiple racial/ethnic backgrounds. The fNIRS study focuses on quantifying the impact of melanation of skin and hair, and hair texture and length on different indices of data quality of the fNIRS signal. Together, this talk identifies technical complications of these technologies and suggests practical ways forward for their use.

FROM TECHNICAL BIASES TO DISPROPORTIONATE EXPOSURE TO STRESS: EVALUATING ETHNORACIAL DIFFERENCES IN ELECTRODERMAL ACTIVITY

Kate Webb
Duke University Medical Center

Conditioning paradigms play an important role in translational research, providing critical insights into the neurobiological mechanisms of learning and memory as well as the development of psychopathology. Among studies with human participants, electrodermal activity (i.e., skin conductance levels and responses) is a sensitive indicator of physiological arousal and the most widely used measure of fear conditioning. However, a persistent methodological challenge is that up to 50% of participants display low or unmeasurable electrodermal activity, often leading to participant removal during data processing and exclusion from subsequent analysis. This talk will review the scientific and ethical implications of this exclusionary practice, which disproportionately impacts ethnoracially minoritized participants. In particular, we will highlight new evidence from a study of fear, safety, and reward learning in an undergraduate sample, suggesting that disproportionate exposure to lifetime stressors and differential use of emotion regulation strategies may help account for ethnoracial variability in responses to conditioned fear stimuli. Finally, strategies to identify drivers of ethnoracial differences in psychophysiology will be reviewed, and best practices for communicating methodological decisions will be discussed.

NEUROPHYSIOLOGICAL EMBEDDING OF RACIALIZED INEQUITIES

Nathaniel Harnett
Harvard Medical School

Neurophysiological measures hold tremendous potential for elucidating the physical bases of emotional processes, and providing actionable biological targets for modifying dysfunctional emotional processes in psychiatric disorders. Such measures, however, not only reflect specific cognitive-affective processes of interest but are influenced by a lifetime of confounding stressors and experiences. Many such confounding factors are disproportionately experienced by racially minoritized groups. Failure to consider these disparities can lead to the mismeasure of humans, the inference of innate group differences in brain and physiology, and contribute to biased, ineffective, and harmful applications. Proper understanding and contextualizing of drivers of race-related variability in neurophysiological research is thus essential for maximizing the benefit of this research. The current presentation will discuss emergent research on race-related biases in neuroimaging and psychophysiological approaches to understanding emotional processes. Findings from children, adolescents, and adults based on multimodal magnetic resonance imaging and peripheral emotional responses will be reviewed in the context of observed drivers of race-related variability through development. Further data related to generalizability issues due to race-related bias will be presented. Finally, actionable considerations and recommendations to rectify race-related biases in neurophysiological research will be discussed.

***Symposium* VI-1**

THE TRANSDIAGNOSTIC ROOTS OF INTERNALIZING PSYCHOPATHOLOGY: A RESEARCH DOMAIN CRITERIA (RDOC) PERSPECTIVE

Chair: Carola Dell'Acqua
University of Padua, Italy

The symposium will highlight the latest psychophysiological research within the RDoC framework, integrating findings across multiple domains to advance our understanding of the mechanisms underlying anxiety and depression. First, Carola's talk will focus on the Positive Valence Systems, demonstrating how ERPs to appetitive stimuli can serve as potential early markers of depression vulnerability across different populations. Second, Kreshnik will present research that uses computational models and ERPs to elucidate reinforcement learning deficits within social anxiety disorder. Then, C.J. will present research at the intersection of Positive Valence and Sensorimotor Systems by demonstrating the utility of an effort-reward paradigm to assess multiple reward-related processes using ERPs and their relationship with physical activity during adolescence. Next, Nicola will turn to the Negative Valence Systems, discussing the combined effects of amygdala volume and functional brain activity on trauma severity across anxiety and mood disorders. Finally, Annmarie will describe patients within the internalizing spectrum, addressing how symptom severity and functional

impairment differentially impact neural responses to negative stimuli. This symposium offers a narrative on the multifactorial nature of internalizing disorders, advocating for a comprehensive, transdiagnostic approach.

REDUCED POSITIVE VALENCE SYSTEMS ACTIVATION IN DEPRESSION RISK: INSIGHTS FROM ERPS

Carola Dell'Acqua, Valentina Mologni, Simone Messerotti Benvenuti
University of Padua, Italy

Depression is a pervasive and debilitating condition, making the early identification of underlying mechanisms and the development of preventive strategies a critical priority. One potential mechanism implicated in the etiopathogenesis of depression is a blunted activation of the Positive Valence Systems. In this talk, I will present a series of studies utilizing event-related potentials (ERPs) to examine multiple stages of affective picture processing—cue engagement, affective anticipation, and elaboration—in individuals at heightened risk for depression, including those with a familial history of depression and individuals with subclinical depressive symptoms. Our findings reveal that at-risk individuals exhibit reduced cue engagement (Cue-P300 amplitudes) and diminished elaboration (Late Positive Potential, LPP amplitudes) in response to appetitive stimuli compared to those not at-risk. These results suggest that attenuated initial engagement with expected pleasant stimuli and diminished motivated elaboration of those stimuli might serve as early markers of depression vulnerability. I will conclude with a brief overview of the efficacy of two interventions—EEG-biofeedback and savoring training—in enhancing LPP responses to appetitive stimuli, highlighting potential pathways for targeted prevention efforts.

USING ERPS TO INVESTIGATE REINFORCEMENT LEARNING IN SOCIAL ANXIETY DISORDER

Kreshnik Burani[1], Andrea Cataldo[1], Kimberly Wang[2], Madelynn Park[2], A.J. Rosellini[3], Stefan G. Hofmann[4], John Gabrielli[2], Daniel Dillon[1]
[1]McLean Hospital - Harvard Medical School, [2]Massachusetts Institute of Technology, [3]Boston University, [4]Philipps-University Marburg

Social anxiety disorder (SAD) is a debilitating psychiatric condition, and many individuals do not respond to treatment. This analysis comes from an ongoing study that is attempting to identify brain-based predictors of treatment response. This interim analysis examines whether event-related potential (ERPs) of reinforcement learning (RL) are sensitive to SAD at baseline. Forty-nine healthy controls (HC) and 62 adults with SAD completed a probabilistic reversal learning task in which participants use feedback to select between two polygon cues associated with different reward probabilities (70% vs. 30%). Behavioral analyses indicate that both groups tend to repeat rewarded choices (win-stay), but making a different choice after losses (lose-shift) is more prevalent in the HC vs. SAD group at trend-level ($p = .091$). Furthermore, in the HC group, lose-shift behavior declines from the first to the second and third blocks ($p = < .001$), suggesting that HC increasingly learn to ignore probabilistic negative feedback; this effect was not robust in the SAD group. Preliminary ERP results indicate that the cue-locked P3 is numerically larger in the HC vs. SAD ($p = .114$), but no group differences in the RewP have emerged. Overall, these initial results indicate that the SAD group has intact reward responses, but they show modest deficits in learning action-reward contingencies. Current analyses are focused on relating cue-locked P3 amplitudes to behavior, examining the RewP as a function of win-stay/lose-shift behavior, and applying more sophisticated computational models to the data.
FUNDING: R01

TEMPORAL DYNAMICS OF EFFORT-BASED REWARD PROCESSING AND THEIR RELATION TO DEPRESSIVE SYMPTOMS IN ADOLESCENCE

C.J. Brush[1], Colin Bowyer[2], Nicholas Santopetro[3], Lauren Keith[3], Greg Hajcak[4]
[1]University of Idaho, [2]Medical University of South Carolina, [3]Florida State University, [4]Santa Clara University

Anhedonia, a hallmark symptom of depression, is marked by alterations in reward processing. While event-related potential (ERP) research has primarily focused on reward liking (hedonic capacity), showing reduced reward valuation in depression, there has been less attention on reward wanting (motivation). These facets of reward processing occur at distinct stages and are critical for developing a more complete characterization of reward-related deficits in depression. Recent ERP research has aimed to quantify both liking and wanting by assessing the impact of effort expenditure on reward processing (i.e., effort-based reward processing). In this talk, cross-sectional data from 119 adolescents (ages 13-17) will be presented to demonstrate that an effort-reward paradigm (i.e., the effort-doors task) can elicit multiple temporally-distinct reward-related ERPs, including neural responses to effort completion and choice-selection cues (effort- and doors-P3), during reward anticipation (stimulus-preceding negativity) and receipt (reward positivity), and during feedback salience encoding (feedback-P3). Effort expenditure uniquely modulated ERPs linked to reward valuation, effort completion, and feedback salience. Adolescents with greater depressive symptoms exhibited altered encoding of effort, as reflected by ERPs elicited during reward anticipation and valuation. These results highlight the utility of eliciting multiple ERPs to parse distinct facets of reward processing and their relevance for understanding individual differences in depressive symptoms among adolescents.
FUNDING: National Institute of Mental Health

AMYGDALA STRUCTURE AND FUNCTION IN TRAUMA-RELATED PSYCHOPATHOLOGY: A MULTIMODAL INVESTIGATION

Nicola Sambuco
University of Bari

Trauma exposure influences mood and anxiety disorders, yet its neural impact remains unclear. While reductions in

amygdala volume and functional activity have been linked to trauma severity, their relationship remains debated. This study used multimodal neuroimaging to examine amygdala structure and function in trauma-related psychopathology. In a sample of women with mood and anxiety disorders (N=100), amygdala volume and functional activation were unrelated ($F(1,161) = .003$, $p = .958$). However, both independently predicted trauma magnitude: smaller amygdala volumes were linked to greater functional impairment ($R^2 = .14$, $p = .001$), while reduced functional activity was associated with the severity of the most traumatic event ($R^2 = .07$, $p = .010$). Mediation analysis found no evidence that amygdala volume mediates the relationship between functional activation and trauma severity (Estimate = -0.017, p=0.900). These findings suggest that structural and functional alterations in the amygdala contribute separately to trauma-related outcomes. Understanding these dissociations can inform future multimodal and longitudinal research on trauma's neural impact.

GROUP-BASED MULTITRAJECTORY MODELING OF AMYGDALA AND LPP

Annmarie MacNamara, Ha Jeong Park, Richard Morris
Texas A&M University

The internalizing disorders may lie along a spectrum, ranging from a single disorder to more severe symptoms/comorbidities and increasing functional impairment. Across this continuum, negative emotionality has been identified as a possible transdiagnostic mechanism. Increased attention to negative stimuli might be expected as symptoms increase across the internalizing spectrum. Nonetheless, functional impairment, which is not synonymous with symptom severity, might blunt reactivity to negative stimuli (e.g., to save resources during times of chronic adversity). Parsing the effects of internalizing symptoms and functioning on attention to negative stimuli may provide a more precise and clinically relevant understanding of affective mechanisms across internalizing psychopathology. Here, participants (N=88) from a mixed, internalizing sample viewed negative, positive, and neutral pictures while EEG was recorded. We examined internalizing symptoms and functional impairment as simultaneous predictors of the late positive potential (LPP). Results showed that higher internalizing symptoms were associated with larger negative > neutral LPPs, $\beta = .382$, $p = .019$, and that increased functional impairment was associated with smaller negative > neutral LPPs, $\beta = -.343$, $p = .034$. No associations were observed for positive pictures. Internalizing symptoms and functional impairment may have opposing effects on reactivity to negative stimuli, with implications for treatments aimed at modulating negative emotionality in internalizing disorders.
FUNDING: NIMH R01MH125083 (MacNamara)

***Symposium* VI-2**

THE IMPACTS OF SLEEP AND PHYSIOLOGY ON INTERNALIZING SYMPTOMS DURING ADOLESCENCE AND THE PERIPARTUM PERIOD

Chair: Emilia Cardenas[1]; Discusssant: Santiago Morales[2]
[1] Pennsylvania State University, [2]University of Southern California

The transition to adolescence and parenthood are associated with a high prevalence of poor sleep, linked to internalizing symptoms. This symposium will present on relationships between sleep (i.e., self-report, actigraphy) and physiological measures (i.e., event-related potentials, fractional anisotropy [FA], resting respiratory sinus arrhythmia [RSA]) on internalizing symptoms. First, Emilia Cárdenas presents results on competing models of associations (i.e., cross-sectional and longitudinal moderation, mediation) between sleep quality, depressive symptoms, and RewP in women assessed across the peripartum period. A cross-sectional interaction between RewP and sleep was associated with mid-pregnancy symptoms such that sleep problems and depressive symptoms were more strongly associated at lower levels of RewP. Second, Sofia Cárdenas presents results on associations between sleep (self-report, actigraphy) and white matter organization as indexed by FA among first-time fathers during early postpartum. Both measures were associated with weaker postpartum FA in cognition and reward processing regions. Finally, Linhao Zhang presents results on moderating effects of sleep duration and variability on RSA and internalizing problems in adolescents. RSA and adolescent sleep interact to predict internalizing problems. Discussant, Santiago Morales, will highlight points of convergence in these data and their implications. Overall, this work underscores the importance of examining potential physiological vulnerabilities that may increase the impacts of poor sleep on symptoms.

ASSOCIATIONS BETWEEN NEURAL REWARD RESPONSIVENESS, SLEEP PROBLEMS, AND DEPRESSIVE SYMPTOMS DURING THE PERIPARTUM PERIOD

Emilia Cardenas
Pennsylvania State University

Peripartum depression impacts birthing parents, with neuroscientific methods used to identify potential depression risk across life stages. Outside of peripartum, reduced reward positivity (RewP), an event-related potential (ERP) measure of reward responsiveness, is associated with depressive symptoms and precedes depression onset. Sleep and alterations in RewP are associated with later depressive symptoms, raising questions about this relationship. Reduced reward responsiveness, as well as depression, is associated with sleep problems and may moderate or mediate the relationship. Sleep changes in the peripartum reinforce the need for this research on the connection between sleep, reward, and depression in this period. The current study investigated competing models of associations (i.e., cross-sectional moderation, longitudinal moderation, and mediation)

between sleep quality, depressive symptoms, and RewP in 120 women assessed across the peripartum period (~20 [T1] and 34 weeks gestation [T2] and 8 weeks postpartum [T3]). At each visit, participants completed an ERP version of the monetary incentive delay task to measure RewP and self-report measures of sleep and depressive symptoms. An interaction between RewP and sleep was associated with T1 symptoms ($b=-0.28$, $\beta=0.35$, $p<.001$); such that sleep problems and depressive symptoms were more strongly associated at lower levels of RewP. A mediation model was not supported. Findings underscore that individual differences in RewP may moderate established effects of sleep problems on depression during pregnancy.

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SLEEP AND WHITE MATTER CONNECTIVITY IN FIRST-TIME FATHERS

Sofia Cardenas
University of Southern California

Fathers are vulnerable to sleep disturbances during the transition to parenthood, which may impact their cognitive functioning. Despite the substantial research linking sleep quality and white matter microstructure (WM) organization, few studies have examined this relationship during early parenthood. The current study investigated sleep and white matter organization as indexed by fractional anisotropy (FA) among 38 first-time fathers. We measured sleep at six months postpartum using self-report (i.e., Pittsburgh Sleep Quality Index [PSQI]) and objective (i.e., actigraphy) metrics. Both measures of sleep quality were associated with postpartum FA. More sleep problems, as measured by the PSQI, were associated with lower FA in the corpus callosum, forceps major, and right longitudinal fasciculus. As measured by actigraphy, sleep problems were associated with greater FA in the bilateral cingulum and corpus callosum body. These findings suggest that fathers' postpartum sleep problems are associated with white matter integrity in cognition and reward-processing regions.

FUNDING: 1F31HD108957-01A1; Health Policy Research Scholars; DGE-1842487

RESPIRATORY SINUS ARRHYTHMIA PREDICTS INTERNALIZING PROBLEMS: THE MODERATING ROLE OF ADOLESCENTS' SLEEP

Linhao Zhang, Assaf Oshri
University of Georgia

Internalizing problems increase significantly during adolescence. Resting respiratory sinus arrhythmia (RSA) reflects parasympathetic nervous system regulation and is linked to an increased risk of internalizing problems. However, this association is not universal. Sleep, a bioregulatory function, plays a crucial role in stress regulation and youth psychopathology. Therefore, the present study examines sleep health as a moderator in the RSA-internalizing problems link. We analyzed data from 144 U.S. adolescents (Mage = 12.89, 52% female): 78.8% European American, 11.5% African American, 3.8% Latino(a), and 1.0% Asian/Pacific Islander. Resting RSA (T1) was recorded while adolescents watched a calming video. Sleep duration and variability at T1 were objectively measured via actigraphy over seven nights. Internalizing problems T2 were assessed using CBCL scale. Demographic covariates, T1 internalizing problems, and weekend frequency were controlled. Sleep duration and variability significantly moderated the RSA-internalizing problems link. For adolescents with high RSA baseline, shorter sleep duration predicted higher internalizing problems. For those with low baseline RSA, greater sleep duration variability was linked to higher internalizing problems. RSA and adolescent sleep interact to predict internalizing problems, highlighting the importance of examining stress response systems within the context of sleep. Interventions should focus on promoting adequate sleep duration and consistent sleep patterns to improve mental health outcomes.

FUNDING: K01 DA045219, R01 DA055630-01

Symposium **VI-3**

PHYSIOLOGICAL SYNCHRONY AND INTIMACY IN CLOSE ROMANTIC RELATIONSHIPS

Chair: Chad Danyluck
Carleton University

Physiological synchrony—a shared physiological state between people—plays a crucial role in intimacy, emerging across emotional discussions, support exchanges, and sexual activity, influencing both relationship closeness and well-being. This symposium brings together research from four independent labs to explore recent advances in understanding how physiological synchrony shapes emotional and physical intimacy in romantic relationships. The first presentation examines variability in physiological synchrony during an emotionally salient discussion between romantic partners, highlighting the role of interaction quality in physiological synchrony and relational well-being. The second presentation investigates the temporal dynamics of physiological synchrony in couples during a support discussion, underscoring how interpersonal physiological processes contribute to relational well-being and stress adaptation. The third presentation explores the impact of sexual assault on physiological synchrony, arousal patterns, and relationship well-being during conversations about sexual intimacy. The final presentation examines physiological synchrony during sexual activity in established couples, finding that synchrony is stronger during sexual encounters than non-sexual interactions, emphasizing its potential role in attraction, sexual satisfaction, and relational well-being. Together, this symposium presents cutting-edge research that advances our understanding of the role of physiological synchrony in shaping daily interactions within our closest, most intimate relationships.

INVESTIGATING VARIABILITY IN ROMANTIC PARTNERS' PHYSIOLOGICAL SYNCHRONY DURING DISCUSSIONS ABOUT THEIR FUTURE

Claire Shimshock[1], Katherine Thorson[2], Brett Peters[3], Jeremy Jamieson[1]
[1]University of Rochester, [2]Barnard College of Columbia University, [3]Ohio University

Physiological synchrony, or similarity in people's physiological responses, can occur during close partners' emotionally salient discussions. However, it is less clear what behavioral processes may be associated with synchrony. We examined whether young adult romantic couples (N = 79 couples) exhibited synchrony in cardiac interbeat intervals (as a measure of general autonomic arousal) during a five-minute discussion about the future of their relationship. Couples were randomly assigned to one of two roles: disclosers shared hypothetical good news (e.g., a dream job offer) and responders reacted to the disclosure. Using a non-directional concurrent synchrony modeling approach (Helm et al., 2018), we estimated synchrony as a dyad-level phenomenon averaged across 20-second intervals. Although synchrony on average was not significant, there was significant variability in couples' physiological synchrony, which ranged from negative (b = -0.32) to positive synchrony (b = 0.43). To investigate sources of this variability, we examined various observer-rated behaviors. When disclosers spoke more (a behavior associated with less satisfying relationships and less positive partner perceptions) and when responders demonstrated more withdrawal, couples experienced less synchrony. When both partners displayed less positive emotion, couples also experienced less synchrony. These findings underscore couples' physiological synchrony as a heterogeneous process that might emerge with the presence of behavioral engagement and positivity while having meaningful discussions about their future.

PHYSIOLOGICAL LINKAGE DURING SUPPORT CONVERSATIONS IN COUPLES

Theresa Pauly, Victoria Michalowski, Yuthika Girme
Simon Fraser University

Physiological co-regulation in romantic couples reflects the dynamic interaction between partners' physiological states, including changes in cardiovascular function and electro-dermal activity. There is, however, little knowledge about which factors determine whether this co-regulation takes the form of stress contagion or stress buffering. This study examines how physiological influence in romantic partners is moderated by individual vulnerabilities (e.g., depressive symptoms, attachment style), external stress (e.g., life stress), and dyadic adaptive processes (e.g., social support, buffering behaviours). Couples (N = 80) took part in a 7-minute support discussion where a support recipient discussed a personal goal with their partner (the support provider). Both couple members had their physiological data recorded using 7 ECG and 2 EDA sensors. Raw signals were aggregated into 5-second epochs. Hierarchical continuous time dynamic models were used to analyse physiological co-regulation, accounting for autoregressive and cross-lagged partner effects. Preliminary findings suggest no physiological linkage in cardiovascular measures (heart rate, IBI). However, there were cross-lagged effects for skin conductance with a 20-second delay between partners. Future analyses will investigate individual differences that moderate physiological co-regulation. This research advances our understanding of how interpersonal physiological processes shape relational well-being and stress adaptation in couples.
FUNDING: SSHRC Insight Developmental Grant: "Loving You Is Work": Does Buffering Peoples' Insecurities Deplete Relationship Partners? [430-2018-0005] SSHRC COVID Supplement "Loving You Is Work": Does Buffering Peoples' Insecurities Deplete Relationship Partners? [409-2020-00009]

SEXUAL TRAUMA AND PHYSIOLOGICAL SYNCHRONY IN ROMANTIC RELATIONSHIPS

Chad Danyluck, Anna Ranger, Yan Liu
Carleton University

Co-regulatory frameworks suggest that sexual intimacy fosters felt security between romantic partners, a process reflected in shared physiological arousal, such as physiological synchrony—patterns of autonomic alignment commonly observed between social partners. Disruptions to sexual intimacy may therefore alter how physiological synchrony manifests in close relationships. This study examined 106 romantic couples in which one, both, or neither partner had experienced sexual assault to assess whether physiological synchrony varied based on sexual assault history. Cardiotropic measures of autonomic nervous system arousal were continuously recorded as couples discussed either positive aspects of their sexual intimacy or, as a control, the positive non-sexual aspects of their relationship. Within-couple intercorrelations of physiological data served as our measure of physiological synchrony. Results indicated that couples without a history of sexual assault displayed significant in-phase autonomic synchrony across conditions. In contrast, couples in which at least one partner had experienced sexual assault exhibited anti-phase physiological synchrony when discussing sexual intimacy. However, when these same couples discussed general aspects of their relationship, their synchrony patterns resembled those of non-victimized couples, displaying in-phase synchrony. Discussion will focus on how sexual trauma shapes physiological co-regulation in romantic relationships, focusing on the implications of in-phase and anti-phase synchrony for relational security and sexual intimacy.
FUNDING: Social Sciences and Humanities Research Council of Canada Insight Development Grant # 430-2021-00681

***Symposium* VI-4**

CONTRIBUTING TO RIGOR AND REPRODUCIBILITY IN THE PEER REVIEW PROCESS: A WORKSHOP FOR EARLY CAREER REVIEWERS

Chair: Andreas Keil
Florida State University

This interactive workshop aims to give insights into the review process at the society's journal, Psychophysiology. Editors will

present data on the effect of peer review on the diversity of published research, on the rate of participation in peer review at different career stages, and on the effect of the quality of peer review on editorial decisions. We will discuss challenges and opportunities of the peer review system from the journal's point of view and from the reviewers' perspective. We will also discuss examples for how effective and constructive peer review may aid in maintaining field standards and how it aids in replicability and reproducibility. Editors will present examples of effective reviews and discuss ways for authors and reviewers to engage in constructive and helpful interactions. The session offers room for discussion throughout, and participants are encouraged to share experiences as well as questions and concerns with respect to the peer review process.

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ABSTRACT

Posters

POSTER SESSION I - 001 | THE INFLUENCE OF AGE AND COGNITIVE LOAD ON RESTING-STATE AND TASK-RELATED ALPHA OSCILLATIONS

Chandlyr Denaro, Catherine Reed, Alan Hartley, Heather Shipley, Alison Harris
Claremont McKenna College

Alpha-band oscillations (7-13 Hz) in EEG data contribute to complex cognitive function and network coordination. Changes in alpha activity are linked to increased attentional demands during task performance and age. Resting-state alpha rhythms show generalized slowing and reductions in power with age. Older adults (OAs) show smaller differences in alpha power between attentional states (decreased alpha suppression) and are less likely to display a peak alpha frequency (PAF). Few studies have examined how age affects resting-state and task-related alpha as cognitive demand increases and whether the aperiodic component may be conflated with age effects. Here we examined how age and cognitive load influenced PAF and alpha suppression during resting- and task-related states with and without the aperiodic component. While EEG was recorded, younger adults (YA; n=33, 18-24 yrs) and OAs (n=30, 64-88 yrs) performed tasks with increasing cognitive load: Resting State (Closed vs Open Eyes) and Task-related State (Passive vs. Active Visual Oddball). Replicating recent literature, YAs had higher PAFs and greater peak alpha power than OAs. Across states, with aperiodic component removal, age effects were lost but condition effects emerged; PAF shift did not interact with age. For alpha suppression, the removal of the aperiodic component revealed a resting-state interaction with age; task-related states interacted with load but not with age. Results suggest that the inclusion of the aperiodic component may conflate true effects of age and load on alpha measures.
FUNDING: NSF DUE #1626554, #1914855, #2400479, & #2227412; NSF BCS #1923178

POSTER SESSION I - 002 | PHYSIOLOGICAL CORRELATES OF EMOTION REGULATION THROUGH ATTENTIONAL DEPLOYMENT

Daniel Rojas-Libano, Christian Salas, Vanessa Corrales, Camilo Arévalo-Romero, Mauricio Boric
Universidad Diego Portales

A widely used emotion regulation model proposes five regulation strategies, and some of them have been much more studied than others. One of the less-studied strategies is "Attentional Deployment" (AD), which involves shifting the attentional focus within a situation to change the emotional experience. Very few tasks have been set up to study AD within the laboratory, and there is a paucity of information regarding the physiological correlates of this process. A long-standing tradition in psychophysiology conceives the capacity of emotional regulation as mediated by a central autonomic network and expressed as increased values of heart rate variability (HRV) and respiratory sinus arrhythmia (RSA) measures. However, we do not know the role that these cardiorespiratory processed play during AD. Here, we analyze cardiac and respiratory data from healthy participants performing an experimental AD task in which people rate emotional images under different attentional conditions. We find that participants consistently change their emotional ratings as a function of the attentional condition, which serves as a behavioral metric for AD (n = 50 participants). Analysis of physiological data from a preliminary cohort (n = 10 participants) shows that participants' RSA, a measure of cardiorespiratory coupling, during the task varies as a function of the behavioral AD measure. Our study thus contributes to understanding the physiological dynamics underlying emotion regulation through AD.
FUNDING: Fondo de Desarrollo Científico y Tecnológico, Fondecyt 1230481

POSTER SESSION I - 003 | AGE-RELATED RESPONSE PRECUEING EFFECT IN A CROSSMODAL SPEED RESPONSE TASK

Pi-Chun Huang[1], Pin-Han Wang[1], Ludivine Schils[2], Iring Koch[2], Denise Stephan[2], Shulan Hsieh[1]
[1]National Cheng Kung University, [2]RWTH Aachen University

This study examined how aging affects the use of spatial and modality-specific precues across perceptual, cognitive, and motor stages. Younger and older adults completed a crossmodal cued response task requiring manual or vocal responses to unimodal visual or auditory targets. Event-related potentials (ERPs) were recorded to assess neural dynamics across processing stages. Behaviorally, longer cue–target intervals (CTIs) improved speed and accuracy, especially with informative precues, and older adults benefited more from extended preparation. However, older adults showed increased errors following spatial precues, reflecting a speed–accuracy trade-off. ERP results showed that younger adults exhibited greater early sensory negativity and larger N1-like responses to spatial precues, whereas older adults showed reduced early modulation. P3 amplitude and cue-type-dependent latency were observed only in younger adults, indicating greater flexibility in cognitive evaluation. Both groups showed earlier motor preparation (LRP) for spatial precues, but older adults were delayed following modality cues. These findings suggest that aging impairs flexible cue use at early stages, while sparing motor-level benefits of spatial information.
FUNDING: NSTC 109-2923-H-006-002-MY3

POSTER SESSION I - 004 | FRONTAL BETA POWER VARIES BY APOLIPOPROTEIN-E E4 STATUS IN COGNITIVELY HEALTHY OLDER ADULTS

Henry Licht, Mary Polking, Christian Otteman, Kristy Nielson
Marquette University

The apolipoprotein-E (APOE) ε4 allele is a primary Alzheimer's disease (AD) risk factor. Insight into its effects on neural patterns could be crucial to improving early diagnosis of AD. Structural differences and functional neural slowing can be identified in the frontal lobes even prior to any evident symptoms of AD. However, healthy aging is also associated with neural changes in the frontal lobes, specifically in the superior frontal gyrus (SFG) and anterior cingulate cortex (ACC)—which both are involved in higher-level cognitive functions such as attention and executive function. Determining if ε4 contributes additionally to neural changes in frontal regions in cognitively healthy elders could be essential to differentiating age-related decline from AD-related decline. Thus, we explored whether ε4 carriers exhibited differences in resting state frontal lobe frequency band power compared to non-carriers. Resting-state EEG (eyes closed) in cognitively healthy elders (N=49, 35F, 24 ε4+, Mage=79.6) showed ε4 groups differed in frontal activity; ε4 carriers had significantly lower relative power specifically in the beta1 band (13-20 Hz), specifically in the left SFG (p=0.037) and left ACC (p=0.049). Despite intact cognition, ε4 contributes to significant decreases in left SFG and left ACC beta-power. APOE ε4-related neural slowing in left frontal executive functioning-related regions in cognitively intact adults may indicate the likelihood for future AD-related cognitive decline.
FUNDING: NSF IRES NSF-1854158 (KAN) Way-Klingler Science Fellowship, Marquette University (KAN) NCATS UL1TR001436, TL1TR001437 (CBDO)

POSTER SESSION I - 005 | AGE MODERATES THE RELATIONSHIP BETWEEN LIFETIME DISCRIMINATION AND RMSSD

Scott McKernan
The New School for Social Research

African Americans (AA) exhibit a paradoxical pattern of high cardiac vagal activity (CVA) and high total peripheral resistance (TPR), a risk factor for cardiovascular events and mortality. Typically CVA and TPR are inversely related and this phenotype in AA has been termed the "Cardiovascular Conundrum". Discrimination has been posited as an important contributor. Given that risk for cardiovascular events and mortality increase with age, we examined if age moderates how discrimination impacts CVA in a sample of AA participants (N=105). We ran two Hayes moderations with age as the moderator, root mean squares of successive differences (RMSSD), a time domain estimate of CVA, as the dependent variable, and lifetime (Model 1) or everyday (Model 2) discrimination as the predictor. Model 1 was significant, $F(4, 100) = 3.55$, $p = .009$. The interaction between lifetime discrimination and age was significant, $b = 0.038$, $SE = 0.019$, $t(100) = 2.04$, $p = .044$, 95% CI = [0.001, 0.074] and accounted for ($R^2 = .0364$) of the variance. Probing the interaction showed that at approximately 46 and 57 years of age, the effect of discrimination on RMSSD were not significant (p's > .05). At 68 years of age, the effect was marginally significant, $b = 0.582$, $p = .053$, suggesting that higher levels of discrimination were associated with higher RMSSD among older adults. The interaction was not significant for Model 2 (everyday discrimination). Lifetime, but not everyday discrimination, may impact CVA most notably later in life pointing towards a critical point for intervention.
FUNDING: This study uses the Midlife in the United States Study (MIDUS). MIDUS is supported by the National Institute on Aging (5R37AG027343, 5P01AG020166, 1R03AG046312, 1U19AG051426) and by the University of Wisconsin Institute on Aging.

POSTER SESSION I - 006 | THE RELATION OF BEHAVIOR AND EEG CORRELATES OF FEEDBACK, COGNITIVE CONTROL AND COGNITIVE EFFORT IN A PREREGISTERED LARGE-SCALE MULTI-SITE ULTIMATUM GAME STUDY

Johannes Rodrigues[1], Johannes Hewig[1], André Beauducel[2], Jürgen Hennig[3], Andrea Hildebrandt[4], Corinna Kührt[5], Leon Lange[6], Erik Müller[7], Roman Osinsky[6], Katharina Paul[8], Elisa Porth[9], Anja Riesel[8], Cassie Short[4], Jutta Stahl[9], Alexander Strobel[5], Jan Wacker[8]
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Decision-making in social bargaining scenarios, such as the Ultimatum Game (UG), are influenced by the offer fairness, but also by dispositional traits and neurophysiological processes representing evaluation (feedback negativity: FRN) or cognitive effort and cognitive control to overcome default behavior (midfrontal theta: MFT). However, the importance of outcome evaluation (FRN) has often been prioritized lately to predict behavior. The present study investigated how offer fairness (high/middle/low), electrocortical correlates of cognitive effort / cognitive control (MFT) and offer evaluation (FRN) as well as individual differences in need for cognition (NFC) shape decision behavior and reaction time as a receiver in the UG. Data were collected as part of the CoScience EEG-Personality Project, a large-scale multi-site study comprising approximately 800 participants. As preregistered, more unfair offers led to more rejection, rejection was linked to long reaction times and reaction times were longest in the middle offer category. Also, partly matching predictions, MFT was a better predictor than FRN for offer rejection, high MFT led to rejection and NFC was linked to rejection of low offers. These findings highlight the importance of the cognitive control and cognitive effort needed to overcome the behavioral default to accept all offers in the UG on several levels: Reaction time, electrocortical correlates of decision processes (MFT) and personality traits (NFC). They question fixation on outcome evaluation markers like FRN in the context of behavioral prediction.
FUNDING: German research foundation (DFG), European Union: ERDF-Project Hyko (1.2-StMWKF.4-UFR-002)

POSTER SESSION I - 008 | NEUROPHYSIOLOGICAL ADAPTATIONS TO EXTREME PHYSICAL STRESS: EEG EVIDENCE FROM A 50 KM ULTRA-MARATHON

Katherine Boere, Nevan Young, Rae Fletcher, Olave Krigolson
University of Victoria

Ultra-running offers a unique opportunity to investigate how the body and central nervous system (CNS) respond to extended physical stress. While the physiological consequences of prolonged exercise are well-documented, including dehydration, glycogen depletion and muscle damage, its effects on cognitive function remain less understood. To address this gap, we examined the neurophysiological effects of a single-day 50 km ultra-marathon in 63 participants. Pre- and post-race EEG assessments included resting-state and a visual oddball task to evaluate inhibitory control, attention, and working memory. We analyzed ERPs and FFT, alongside physiological markers such as body weight changes, heart rate, and self-reported nutritional intake. Results revealed a reduction in N200 and P300 amplitudes post-race, evidence of impaired inhibitory control and a reduced capacity to process task-relevant stimuli. These changes were accompanied by shorter P300 latencies and faster reaction times, pointing toward a potential adaptation in decision-making strategy towards automatic processing modes to conserve metabolic energy. In addition, post-race resting delta power increased which we propose indicates the brain's response to physiological stress and its effort to restore homeostasis. Taken together, these findings demonstrate that ultra-endurance exercise alters both task-evoked and resting-state brain activity, offering new insights into how the brain responds to extreme physical stress.
FUNDING: NSERC

POSTER SESSION I - 009 | TIME-FREQUENCY THETA AND DELTA ACTIVITY DURING THE N2-P3 COMPLEX EVIDENCE UNIQUE RELATIONSHIPS TO THE LATE POSITIVE POTENTIAL (LPP)

Nadia Mattanah, Spencer Fix, Edward Bernat
University of Maryland, College Park

Background: Evidence suggests that the Late Positive Potential (LPP) in response to affective pictures, and the preceding P3, are importantly related to stimulus significance and involve a dynamic interplay in cognitive-affective processing. However, the N2-P3 complex (i.e. including the P3) has been widely studied using time-frequency methods, revealing distinct theta (3-7 Hz) activity related more to salience activity, and delta (0-3 Hz) more related to complex cognitive processing. The current study assesses contributions of theta and delta during the N2-P3 complex to the subsequent time-domain LPP amplitude to identify separable mechanisms influencing the LPP. Methods: Adults (N=266, M=35.96 years, SD=16.22) completed a common emotion regulation task, viewing pleasant, unpleasant, and neutral pictures while told to view, increase, or decrease their emotional responses. Correlations tested relationships between TF activity during the N2-P3 complex and the LPP across task conditions. Linear regressions examined the unique contributions of theta and delta to the LPP. Results: Across conditions, significant correlations existed between the LPP and TF delta ($r=.133$, $p<.001$) and TF theta ($r=.241$, $p<.001$). The linear regression model revealed unique associations of both delta ($t=5.617$, $p<.001$) and theta ($t=10.629$, $p<.001$) with the LPP. Discussion: Results indicate theta and delta activity during the N2-P3 complex play unique roles generating the LPP, suggesting salience and evaluative processes reflected by theta and delta are relevant, separable targets for studying the LPP.

POSTER SESSION I - 010 | MECHANISTIC MODELING OF SKILL ACQUISITION IN TAI CHI PRACTICE VIA LOW-DIMENSIONAL, ENERGY-BASED DYNAMICS OF THE FUNCTIONAL CONNECTOME

Jonathan Cerna[1], Prakhar Gupta[1], Maxine He[1], Liran Ziegelman[1], Yang Hu[2], Manuel Hernandez[1]
[1]University of Illinois Urbana-Champaign, [2]San Jose State University

Although previous evidence suggests that Tai Chi (TC) benefits cognitive function and its underlying functional connectivity, its precise neural mechanisms remain poorly understood. No studies have leveraged recurrent neural network motifs (RNNMs) to quantify neural reorganization during skill acquisition or identify practice-dependent changepoints. We hypothesized that analyzing brain energy landscapes from RNNMs would reveal distinct adaptations at specific practice thresholds. Resting-state EEG data were collected from older adult Tai Chi practitioners (n=15) and source-localized. Hidden Markov Models were applied to extract RNNMs, which were clustered using a Leiden community-detection algorithm. Network energy was computed using Boltzmann approximation and compressed with UMAP. Pruned Exact Linear Time detected changepoints in energy landscape metrics of interest (Earth Mover's Distance, Lempel-Ziv complexity, transition entropy, Lyapunov exponents). Random Forest regression (RFR) with permutation importance identified key motifs that predicted metrics of interest. Two consistent changepoints occurred at 1040 and 2860 hours. RFR ranged from R^2 ranged from 0.40 ($\pm$0.23; RMSE=0.13) to 0.53 ($\pm$0.18; RMSE=0.0027), where key motifs' composition was primarily composed of Limbic-Ventral Attention and Dorsal Attentional-Visual interactions. Topological whole-brain energy dynamics suggest practice-dependent neural reorganization and RNNMs appear to predict such dynamics, offering novel insights into TC-related brain plasticity.

POSTER SESSION I - 011 | EMOTIONAL AROUSAL AND NEUROCIRCUIT PRIMING: A CONCURRENT TMS-FMRI INVESTIGATION OF STATE DEPENDENCE

Jayce Doose[1], Sara Hashempour[1], Marlen Gonzalez[2], Bashar Badran[1], Mark George[1], Lisa McTeague[1]
[1]Medical University of South Carolina, [2]Cornell University

Background: Transcranial magnetic stimulation with functional magnetic resonance imaging (TMS-fMRI) enables causal neurocircuit mapping. Single pulse TMS (spTMS) to cortical regions allows mapping of connected networks through BOLD response. This study examined whether emotional arousal influences responsiveness of fronto-parietal and somato-motor networks to spTMS. Methods: Twenty-four healthy participants viewed pleasant, neutral, and unpleasant IAPS pictures in blocks during fMRI scanning. While pictures were displayed, spTMS was intermittently delivered to left dorsolateral prefrontal cortex (dlPFC) or primary motor cortex (M1) as a comparison site. Picture and fixation blocks without TMS were interspersed with TMS blocks. Results: TMS to dlPFC during emotional picture processing versus fixation increased BOLD responses in bilateral fronto-parietal regions (bilateral dlPFC and intraparietal sulci). TMS to M1 during picture blocks increased BOLD responses in cerebellar regions of the somato-motor network. Without TMS, activation occurred in visual cortices and amygdalae during emotional picture viewing, which persisted during concurrent TMS. Conclusions: Therapeutic repetitive TMS increasingly involves manipulating cognitive/affective states during treatment through immersive environments, visual cues, and imaginal exposure. Our findings suggest emotional arousal during TMS increases activation in interconnected networks, indicating that varying emotional arousal during rTMS may strengthen targeted network responses.
FUNDING: DARPA

POSTER SESSION I - 012 | DOES THE N2PC COMPONENT REFLECT ATTENTIONAL DEMANDS SIMILARLY AT DIFFERENT TARGET ECCENTRICITIES?

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[1]University of Bristol, [2]Université de Montréal

The N2pc is an event-related potential used to track covert visual attention in the absence of eye movements. Though visual stimuli displayed laterally often engage attention when they are task-relevant, visual acuity decreases with increasing stimulus eccentricity, usually increasing task difficulty and decreasing N2pc amplitude. Our goal was to determine if the same attentional demands at different eccentricities produce comparable N2pc results. Participants counted the number of gaps on target shapes (up to 2 gaps per target) across six displays (up to 12 gaps total). Each display contained two different shapes (one in left visual field, the other in right visual field), one of which was the target. We predicted that attentional demands would increase as the number of gaps to be individuated increased (0, 1, or 2). To determine the impact of eccentricity, items could be closer or farther from fixation. As predicted, N2pc amplitude increased with an increasing number of target gaps. We also observed a smaller N2pc for objects closer to fixation, replicating earlier findings. For 1-gap and 2-gap displays, effects of numerosity and eccentricity on N2pc amplitude were additive. These and other findings suggest eccentricity and the need to identify target features may affect covert attention via different underlying mechanisms.
FUNDING: Natural Sciences and Engineering Research Council of Canada (grant title: Cognitive neuroscience of attention and sensory working memory; ID: RGPIN-2017-06679)

POSTER SESSION I - 013 | SOCIAL MOTIVES AND ELECTROENCEPHALOGRAPHIC RESPONSES TO ALCOHOLIC IMAGES IN COLLEGE-AGED DRINKERS: THE ROLE OF BINGE DRINKING

Reiko Graham, Caydin Hazziez, Allison Zborowski, Natalie Ceballos
Texas State University

Binge drinking (BD) is associated with increased risk of accidents, injuries, and sexual assault. We examined college drinking

patterns, alcohol-related attitudes and neural responses to alcohol images. Sixty-six undergraduate drinkers (21 male, mean age = 21.8 years) provided information about alcohol-related attitudes and behaviors and completed a Go/No-go task while EEG was recorded. The task consisted of 2 runs: in one, participants responded to alcohol images and withheld responses to non-alcoholic drinks; in the other, responses were reversed. Two groups were created; one that endorsed BD as their typical drinking pattern (BD, n = 32) and one who did not (NBD, n = 34) and compared on impulsiveness, alcohol-related attitudes, motives, and expectations, and cortical activity elicited by the different beverages. Groups did not differ in terms of alcohol consumption, age of first intoxication, or recency of regular alcohol use. However, BD individuals were more impulsive, more likely to have social motives for drinking, and more likely to endorse the reinforcing effects of alcohol. N2 amplitudes were more negative for alcohol trials in both groups, especially when they were instructed to ignore these images, suggesting that these stimuli captured attention, and that more effort was required to inhibit responses to alcohol in both groups of drinkers. BD individuals had faster P3 latencies, regardless of beverage type and lower P3 amplitudes overall, but especially for non-alcoholic beverages, an effect that may reflect a risk for future alcohol use disorders.
FUNDING: NIH/NIAAA 1R15AA026076-01A1

POSTER SESSION I - 014 | PREDICTION ERROR EFFECTS IN RESPONSE TO OMITTED FEEDBACK IN EVENT-RELATED POTENTIALS IN HUMANS

Constanze Weber, Christian Bellebaum
Heinrich Heine University

Consistent with the coding of a reward prediction error (RPE) by dopamine neurons, their firing frequency decreases when expected reward is omitted. The RPE is also reflected in scalp-recorded event-related potentials (ERPs) in humans during feedback learning, with the earliest RPE-related signal occurring between 200 and 350 ms after feedback onset. For the processing of sensory action consequences, it has been argued that ERPs in response to omitted stimuli provide a correlate of a (sensory) prediction error. We hypothesized that an RPE would be represented in scalp-recorded ERPs for omitted performance feedback. ERPs were recorded while participants learned to choose the more favourable of two actions based on the presentation or omission of positive or negative feedback. Trial-by-trial RPEs derived from a reinforcement learning model were related to single-trial ERPs, time-locked to the time point of the (omitted) feedback. We found RPE representations in frontocentral and centroparietal electrodes for feedback omission, starting centroparietally at the time point when positive feedback was expected (i.e., for negative feedback), most pronounced at about 340 ms. More unexpected reward omissions were associated with more negative amplitudes. Sustaining RPE coding for unexpected omissions of negative feedback (i.e., positive feedback) started after ca. 500 ms, with more positive amplitudes for larger RPEs. These findings suggest that feedback omission is processed similarly as presented feedback, with distinct encoding of positive and negative RPEs.

POSTER SESSION I - 015 | EMOTION REGULATION IN MORAL DECISION MAKING: THE MODULATORY ROLE OF HEART RATE VARIABILITY

Ömer Erdoğan[1], Giulia Buodo[1], Elisabetta Cremonese[1], Michela Sarlo[2]
[1]University of Padova, [2]University of Urbino Carlo Bo

According to the dual-process theory, moral decision-making arises from the interplay between automatic emotional intuitions and slower cognitive control. This study investigated whether resting heart rate variability (HRV), a physiological marker of emotion regulation, interacts with individual traits - self-reported emotion regulation capacity and empathy - in shaping choices and emotional responses to moral dilemmas. Forty-four undergraduates were presented with 20 sacrificial dilemmas (10 trolley-type, 10 footbridge-type) and 10 everyday dilemmas involving moral transgressions. Participants' choices (utilitarian vs. non-utilitarian) were collected along with arousal and valence ratings during decision-making. HRV (RMSSD), difficulties in emotion regulation (DERS), and empathy (IRI) were entered as predictors in hierarchical regression models. In trolley-type dilemmas, higher HRV predicted lower arousal in individuals with good impulse control and higher arousal in those with poorer control, suggesting that the effectiveness of autonomic regulation under emotional distress depends on cognitive control capacity. In everyday moral dilemmas, greater control difficulties predicted less morally appropriate choices and higher unpleasantness. Empathic concern was positively associated with both moral behavior and emotional valence, while resting HRV showed no moderating effects. Results suggest that HRV supports emotion regulation in morally conflicted contexts requiring cognitive control, while in everyday dilemmas moral responses are shaped mainly by dispositional traits.

POSTER SESSION I - 016 | NON-INVASIVE BRAIN STIMULATION OF THE VENTROMEDIAL PREFRONTAL CORTEX IMPROVES BEHAVIORAL INHIBITION BY ENHANCING THE PROCESSING DEPTH AND ANTICIPATION OF OUTCOMES IN A GAMBLING TASK

Thomas Kroker
University of Münster

A lack of behavioral inhibition is characteristic for pathological gambling and other behavioral addictions so that patients repeatedly make disadvantageous decisions and fail to disengage from maladaptive behavior. Altered ventromedial prefrontal cortex (vmPFC) activity was associated with behavioral addictions in previous research, making it an interesting target for neuromodulation. By developing a gambling paradigm containing positive and negative expected value trials we investigated decision-making and feedback-processing. We stimulated the vmPFC using transcranial direct current stimulation and recorded neural responses via EEG.At the behavioral level interactions of stimulation and cue modulated gambling behavior, which display different patterns for positive and negative expected value trials. We observed the respective neural interaction in left dlPFC and parietal areas. In the feedback-phase

the stimulation modulated the processing of outcomes in dependency of its probability in the behavioral and neural data. The behavioral results suggest improved gambling after vmPFC-excitation, especially when the risk of losing is high, visible in an enhanced behavioral inhibition. This appears to be due to an enhanced anticipation and processing depth of outcomes. The neural results indicate that vmPFC excitation induces an enhanced ability to suppress high-risk decisions and an increased updating of gambling-related information. This makes excitatory vmPFC-tDCS promising as an additional treatment option for behavioral addictions.
FUNDING: This work was funded by the DFG (projects JU 445/9-1 and JU 445/10-3), by the Interdisciplinary Center for Clinical Research of the University of Muenster (project Ju2/024/15), and by the Polish National Science Center (project UMO-2018/31/G/HS6/02490). The authors acknowledge support from the Open Access Publication Fund of the University of Muenster and have no conflicts to declare.

POSTER SESSION I - 018 | VICTIM OF CIRCUMSTANCE: HOW LOCUS OF CONTROL AND SEX INFLUENCE CORTISOL LEVELS IN RESPONSE TO A PSYCHOSOCIAL STRESSOR IN CHILDREN

Maryse Arcand[1], Catherine Raymond[2], Alexe Bilodeau-Houle[1], Marie-France Marin[2]
[1]University of Montreal, [2]Université du Québec à Montréal

Locus of control, defined as the attributions individuals make to explain the causes of events, modulates cortisol levels during stress response. In adults, internal locus of control (self-related) is associated with lower cortisol reactivity, whereas external locus of control (environment-related) is associated with higher reactivity and differs by sex. The link between locus of control and cortisol recovery remains untested, particularly in youth, a population sensitive to the high effects of cortisol due to brain development. This study examines the link between locus of control, cortisol reactivity, and recovery in youth during a stressor, and explores the moderating effect of sex. Salivary cortisol samples were collected from 98 healthy youth (38 boys) aged 8 to 12 years were exposed to a psychosocial stressor. Locus of control was measured after the stressor using a questionnaire about self-perceived performance during the stress task (success or failure). Moderation analyses were conducted on cortisol levels (reactivity and recovery), with locus of control as the predictor and sex as the moderator and repeated separately in children according to their perception of the stress task (success or failure). Although no effect was found for reactivity, higher external locus was associated with higher cortisol levels during recovery for boys. This relationship was mostly driven by boys who rated their performance as successful. Future interventions should consider targeting locus of control among boys to improve recovery of their stress responses in stressful situations.
FUNDING: The Foundation of the University Institute of Mental Health of Montreal

POSTER SESSION I - 019 | DEVELOPMENTAL DIFFERENCES IN GAMMA-BETA BAND OSCILLATORY ACTIVITY IN CHILDREN AND ADULTS PERFORMING THE AUDITORY NOVELTY ODDBALL PARADIGM

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While beta has been related to an executive inhibitory function in motor and cognitive tasks, gamma has been related to processing of sensory information and associative learning. These frequency bands may work in concert to help children predict future occurrences and minimize errors. Prior research has shown developmental trends using wavelet analyses of an early gamma region of interest (ROI) related to P1 (34-64 ms) and an early beta ROI related to N1 (92-124 ms). Specifically, gamma decreased and beta increased with age in 204 participants aged 7-25 performing an auditory novelty oddball paradigm. This study examines four additional gamma/beta ROIs: a middle gamma ROI (180-200 ms), a middle beta ROI (272-358 ms), a late gamma ROI (352-362 ms), and a late beta ROI (548-590 ms). Two 3x3 factorial repeated-measures ANCOVAs with Age3 as a covariate compared the means of the three gamma ROIs and the three beta ROIs at all three tones. For the gamma ROIs, significant effects were found for Time ($p<.001$), Tone ($p<.001$) and interaction of Age3 with each ($p<.025$). For the beta ROIs, significant effects were found for Time ($p<.001$), Tone ($p<.001$), and Age3 ($p=.004$). Gamma and beta plots of the tones showed that the frequent tone has significantly less power than the target and novel tones at each ROI. Additionally, all three tones follow the same pattern of a significant decrease in power between T1 and T2/T3, but not between T2 and T3. These results indicate developmental trends of multiple gamma-beta oscillations with tones demonstrating unique patterns over time.
FUNDING: NIH/NICHD (K01HD001201) to PLD

POSTER SESSION I - 020 | EARLY LIFE MOTOR DEVELOPMENTAL MILESTONE ATTAINMENT PREDICTS CONFLICT MONITORING DURING PREADOLESCENCE

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Early in life, the timing of motor developmental milestones (MDMs) offers insight into neurodevelopment and may serve as early indicators of later cognitive control. While early MDMs are linked to long-term health, their relationship to neurocognitive function remains unclear. This study tested whether the age of MDM attainment predicted neural markers of conflict monitoring in preadolescence. Guardians of 110 children (8–11 years) retrospectively reported the age (mo.) their child independently achieved five MDMs: holding head up, rolling over, sitting, standing, and walking. Children completed a modified flanker task while event-related potentials (ERPs) and task performance were recorded: error-related negativity (ERN; 0–150 ms at FCz),

post-error positivity (Pe; 200–600 ms at CPz), and post-error slowing (PES) on commission error trials. Results indicated that later attainment of head control (R^2Adj = .05, p = .012), sitting (R^2Adj = .04, p = .039), and walking (R^2Adj = .06, p = .037) predicted a more negative ERN, reflecting heightened conflict monitoring. Earlier rolling over predicted a larger Pe (R^2Adj = .04, p = .05), indexing greater conscious error awareness. Children demonstrated PES (t(109) = 3.35, p < .001); however, PES was unrelated to MDM timing. These findings suggest that the timing of MDM attainment, especially in postural and locomotor milestones, is linked to neural processing of errors. MDM timing may reflect early maturation of circuits supporting motor and cognitive control, offering a potential marker of later neurocognitive function.

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POSTER SESSION I - 021 | DEVELOPMENTAL ASSOCIATIONS BETWEEN FRONTAL ERP COMPONENTS AND INHIBITORY CONTROL IN CHILDHOOD

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Executive function supports goal-directed behavior, with inhibitory control enabling individuals to suppress automatic or habitual responses. Event-related potentials (ERPs) provide valuable insight into the neural processes underlying executive function. The N1 component reflects early attentional allocation, while the N2 component is linked to discrimination and response inhibition. This study examined how N1 and N2 amplitudes relate to performance on the ERP Zoo Task and the Head-Toes-Knees-Shoulders (HTKS) behavioral task in 75 typically developing children aged 5–13. N1 and N2 were measured at the Fz electrode. Correlational analyses revealed that greater N1 amplitude was significantly associated with higher accuracy on the Zoo Task (r = .23, p = .023), suggesting that early attention supports effective stimulus evaluation and behavioral regulation. Although the correlation between N2 amplitude and response time did not reach significance (r = –.17, p = .073), it suggested that more robust discrimination may support faster responding. Zoo Task accuracy was also positively related to HTKS performance (r = .32, p = .003), indicating shared mechanisms of inhibitory control. Additionally, HTKS scores correlated positively with age (r = .52, p < .001) and negatively with both mean and variance measures of response times (r = -.31, p = .004 and r = -.53, p < 001, respectively). These results highlight the potential of integrating ERP and behavioral data to better understand executive function development in childhood.

POSTER SESSION I - 022 | SELF-REPORTED CHILDHOOD TRAUMA AND HEART RATE VARIABILITY ACROSS COMMON RESEARCH SAMPLING SITES: IMPLICATIONS FOR META-ANALYTIC WORK

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Childhood trauma is a critical determinant of long-term psychological and physiological health, including autonomic nervous system function. However, trauma exposure and physiological outcomes may vary across different psychological research and clinical settings, posing a potential methodological problem for meta-analyses across studies with different recruitment and sampling sites. This study investigates whether rates of childhood trauma and HRV differ significantly across six common psychological sample sites: general community (midwestern USA), jails/prisons, inpatient hospital units, college campuses, self-help/substance-use related groups, and outpatient mental health clinics. Data were drawn from the MIDUS 2 and MIDUS Refresher studies. A novel bootstrapping approach was used to simulate study recruitment across the six sites based on self-reported demographics and life experiences. Childhood trauma was assessed using the Childhood Trauma Questionnaire (CTQ), and lf-HRV and hf-HRV indices were measured via standard physiological protocols. One-way ANOVAs were conducted to compare trauma and HRV scores across sites. ANOVA results revealed small but statistically significant differences in both CTQ scores and HRV across sample sites (p < .001). Post-hoc analyses suggest a small effect of sample site on HRV and a small-to-medium effect of sample site on CTQ subscale scores, underscoring the importance of contextual factors in psychological research. These findings highlight a need for careful consideration of sampling context when interpreting trauma-related outcomes.

POSTER SESSION I - 023 | RESTING-STATE EEG SIGNATURES OF GENETIC DIAGNOSIS IN NEURODEVELOPMENTAL CONDITIONS: PRELIMINARY FINDINGS FROM THE FIRST 80 Q1K PARTICIPANTS

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Neurodevelopmental disorders (NDD) are early-emerging conditions involving cognitive, social, or emotional challenges. While genome sequencing can identify genetic contributions in NDD, it remains costly. EEG offers a scalable way to explore brain-based biomarkers and provides insight into neural mechanisms

that may inform more tailored interventions. Using pilot data from the Quebec 1000 Families (Q1K) cohort, we analyzed EEG spectral features in controls (Ctl; n=27), individuals with a neurodevelopmental condition (Neurodev; n=28), and with a known genetic mutation (GMC; n=25). Analyses controlled for age, sex, and IQ. Participants aged 3–58 years (Ctl: M=35.7; Neurodev: M=24.6; GMC: M=18.1), IQs 105.2, 98.9, 94.9, and female 63%, 57%, 48%. Absolute alpha power was significantly elevated across regions in GMC ($F(2, 77)=3.45$, $p=.04$; GMC > Ctl/Neurodev, both $p < 0.001$). Relative high gamma power was consistently lower in GMC, particularly in occipital and parietal regions (Occipital: $F(2, 77)=5.26$, $p=.008$; Parietal Left: $F(2,77)=3.96$, $p=.025$, GMC < Ctl/Neurodev, both $p < .001$). Neurodev participants often showed intermediate values but differed from both groups on features such as periodic theta and low gamma power, suggesting an intermediate neural phenotype without a known genetic variant. These patterns are consistent with greater EEG phenotype severity in GMC. Age and sex differences are a limitation of the current sample, which reflects the first 80 participants. Ongoing data collection is expected to balance group distributions.
FUNDING: Fondation Marcelle et Jean Coutu, Fonds de Recherche du Québec, Canadian Research Chair (T1) Pediatric Neurodiversity, UNIQUE

POSTER SESSION I - 024 | RESTING RSA AS A MODERATOR OF THE LINK BETWEEN CHILD TEMPERAMENT AND TASK RSA DURING PARENT-CHILD INTERACTIONS

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High resting-state respiratory sinus arrhythmia (RSA) and child temperament are trait-like indicators of self-regulation (Porges, 1995, 2011), while task RSA reflects state-like responses to immediate demands. Child temperament is linked to RSA reactivity: lower effortful control (Kiel et al., 2024) and higher surgency predict heightened physiological reactivity (Zhou et al., 2022). However, links between temperament and RSA reactivity may be shaped by children's resting-state RSA. Given that high resting RSA indicates better regulatory capacity, we hypothesized that the link between temperamental reactivity and task RSA would weaken or reverse among children with higher resting RSA. Data included 128 parent–child dyads (Mage_child=5.33). Dyads completed a 2-minute resting task and three 8-minute DB-DOS tasks (art project, puzzle, free play). RSA was measured via ECG, extracted in 30-second epochs. Parents completed the CBQ (Rothbart et al., 2001) for surgency/extraversion and effortful control (EC) scores. Multilevel models predicted task RSA by epochs (Level 1); child temperament and resting RSA (Level 2), with interactions tested. A significant Surgency × Resting RSA interaction emerged in the art ($p=.005$) and puzzle ($p=.02$) tasks. Simple slopes showed that higher surgency predicted lower task RSA reactivity at high resting RSA (art: $b=.23$, $p=.04$; puzzle: $b=.22$, $p=.05$), but not at low resting RSA. No significant EC × Resting RSA interactions were found. Findings suggest that the association between surgency and RSA reactivity varies based on children's resting RSA.
FUNDING: NIMH, R01 MH130007

POSTER SESSION I - 026 | MEASUREMENT MATTERS: HOW MEASUREMENT IMPACTS THE RELATION BETWEEN EARLY LIFE EXPERIENCES AND HPA RESPONDING

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The Pennsylvania State University

The development of stress reactivity is known to be responsive to programming effects of early life experiences, although the nature of these effects has been inconsistent (e.g. blunted or exacerbated responses). Quantifying reactivity is challenging as the prototypical response is curvilinear, indicating that area under the curve (AUC) may be a more comprehensive measure than a reactivity change score. However, there may be important implications of how area under the curve is calculated. Calculation with respect to baseline (AUCb) inherently corrects for individual differences in starting cortisol levels, thus capturing only the change in cortisol resulting from the experimental manipulation. Comparatively, calculation with respect to ground (AUCg) incorporates individual differences in the starting point, differentiating true blunted reactivity from that due to ceiling effects. This prospective study of n = 1032 families examined how parenting styles measured at 6, 15, 24, and 35 months related to child temperament at 35 months, and child cortisol reactivity at 48 months. There was a significant indirect effect such that greater intrusive parenting was associated with a higher AUCg via child frustration (Estimate = 0.026; 95% CI = 0.013, 0.040). An inverse effect was found for sensitive parenting. No effects were observed for AUCb. These results suggest that early life exposures prime the HPA system affecting both resting cortisol and reactivity to stress that is best captured as a comprehensive measure of overall output and may be missed using other calculations.
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POSTER SESSION I - 027 | ADOLESCENT SOCIAL MEDIA ENGAGEMENT AND REWARD-RELATED BRAIN ACTIVITY

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Adolescence is a critical period for the development of neural systems that support reward processing and emotion regulation. Social media use is nearly universal in this age group and is known to engage brain regions involved in reward, yet little is known about how specific patterns of engagement relate to adolescents' neural responses to reward. In this study, participants included 66 adolescents (51.5% girls; 80.3% non-Hispanic White) aged 12 to 17 (M=13.9, SD=1.4) at elevated risk for depression.

They completed the Doors task, a monetary reward paradigm involving gain and loss feedback, while EEG was recorded to measure the reward positivity (RewP), an event-related potential indexing early neural responsiveness to feedback. Participants also completed the Social Media Engagement Scale (SMES), a self-report measure assessing behavioral (e.g., routine use), affective (e.g., emotional dependence), and cognitive (e.g., preference and reliance on social media) engagement. Analyses revealed that greater cognitive engagement was associated with a blunted RewP to gain feedback, indicating reduced neural sensitivity to positive outcomes. No significant associations were found for loss feedback or for the affective or behavioral subscales. These findings suggest that adolescents who report a stronger preference and reliance on social media show reduced neural sensitivity to positive outcomes. This blunted reward response may offer insight into how certain patterns of social media engagement relate to changes in the way adolescents evaluate and respond to rewarding experiences.
FUNDING: F31 MH135649; National Institutes of Health

POSTER SESSION I - 028 | HAPPE AND MADE EEG PIPELINE COMPARISON FOR THE HEALTHY BRAIN AND CHILDHOOD DEVELOPMENT (HBCD) STUDY

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The HEALthy Brain and Childhood Development (HBCD) study is a multi-site, large-scale endeavor that seeks to quantify early neural markers of development through neuroimaging. Due to the high volume of data, automated EEG preprocessing pipelines are needed to ensure data are cleaned both efficiently and reliably. This study compares two EEG preprocessing pipelines, the Harvard Automated Processing Pipeline for EEG (HAPPE; Gabard-Durnam, 2018) and the Maryland Analysis of Developmental EEG (MADE; Debnath, 2020), using the pilot data from the HBCD project. Both pipelines were run with consistent general parameters: 0.3–50 Hz band-pass filtering, outer-layer channel removal, average re-referencing, ±200 μV voltage thresholding, and interpolation of bad channels and segments. We evaluated trial and subject-level retention across three task-based paradigms – Face Processing, Visual Evoked Potentials, and Mismatch Negativity – as well as in resting state EEG. MADE retained more trials and subjects across all task conditions, while HAPPE retained slightly more subjects for the resting state data. Although task data processed through MADE had larger ERP amplitudes and effect sizes across most conditions, data processed through HAPPE exhibited similar trends, suggesting comparable signal features. Power spectral densities were then computed using a fast Fourier transform on resting state EEGs from each pipeline, revealing absolute power values that were broadly similar. Our findings highlight the importance of comparing standardized pipelines to ensure high quality infant EEG data.
FUNDING: This research was supported by the NIH (U01DA055316 & U24DA055330).

POSTER SESSION I - 029 | FATHER-CHILD DYNAMIC INDIVIDUAL RSA AND RSA COREGULATION: ASSOCIATIONS WITH POSITIVE BEHAVIORAL COREGULATION

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Individual respiratory sinus arrhythmia (RSA) and RSA coregulation vary by contextual demands and are supported by positive parent-child behaviors (Li et al., 2024; Lunkenheimer et al., 2018). But we know little about how parent-child behavioral and RSA coregulation are related, particularly among father-child dyads. We examined associations between father-child behavioral coregulation and individual RSA and RSA coregulation across contexts. Participants were 60 father-child dyads (65% Non-Hispanic White). At 3 years old, RSA was collected and behavior was coded during a challenging task that includes 3 conditions (baseline, challenge, recovery). RSA was collected in 30-s epochs with a 1-s sliding window to reflect s-by-s RSA. Behavioral coregulation reflected the probability that paternal autonomy support was followed by child compliance. Multilevel models showed that during baseline there was no RSA coregulation nor were there significant associations between behavioral coregulation and individual or coregulation of RSA. During challenge there was concurrent negative RSA coregulation (β = -.01, 95% CI [-.014, -.004]) and higher levels of behavioral coregulation were associated with increases in father RSA. During recovery, there was concurrent positive RSA coregulation (β = .01, 95% CI [-.014, -.004]) and no significant associations between behavioral coregulation and individual or coregulation of RSA. Findings suggest behavioral coregulation shapes fathers' individual RSA in response to challenge and that there are unique coregulatory processes during recovery.
FUNDING: NICHD T32HD101390, K01HD068170, R01HD 097189

POSTER SESSION I - 031 | NEURAL RESPONSES TO SOCIAL REWARDS ARE ASSOCIATED WITH ADOLESCENTS' DAILY AFFECT IN RESPONSE TO SOCIAL EVENTS

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Neural responses to reward have been associated with the strength of real-world affective responses in adult samples. During adolescence, a time of dramatic social reorientation, the association between neural responses to social rewards and affective responses to daily social events may be particularly important to investigate. The current project sought to examine whether neural response to social feedback as measured by the reward positivity (RewP), an event-related potential component, is associated with affective responses to both positive and negative social events with family and friends. To this aim, 108 adolescents (51.43% female) completed the Island Getaway task while EEG was recorded, as well as a 10-day ecological momentary assessment where they reported on positive and negative social events once per day and positive affect (PA) and negative

affect (NA) three times a day. As expected, more positive social events were associated with greater PA and more negative social events were associated with greater NA. Additionally, negative family events were most strongly associated with daily NA for those with larger RewP ($\beta = .005$, $p = .01$). Finally, on days that individuals reported fewer positive family events, those with greater RewP reported greater NA ($\beta = -0.005$, $p < .001$). These results suggest that neural response to social reward may be associated with stronger affective responses to both positive and negative social events in adolescents' daily lives.
FUNDING: Canada Institutes of Health Research Canada Graduate Scholarships – Doctoral (CGS-D)

POSTER SESSION I - 033 | THE MODERATING EFFECTS OF POSITIVE AFFECT ON INHIBITORY CONTROL AND P3 FOLLOWING ACUTE EXERCISE

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Acute exercise enhances inhibitory control and P3 ERP, yet the moderating role of positive affect remains underexplored. Methods: This study investigated the moderating role of positive affect on inhibitory control and P3 following self-selected, moderate-intensity acute exercise. Undergraduate students (n = 76; female n = 51) completed two laboratory sessions. The exercise session included 20-minutes of self-selected treadmill running. The sedentary control session including 20-minutes of studying for class. Pre- and post-session assessments included inhibitory control (flanker task) and electroencephalography (EEG) measures. Positive affect, assessed via PANAS, was used to categorize participants into higher (HPA; n = 40) and lower (LPA; n = 36) positive affect groups. Results: In the LPA group, exercise (compared to sedentary control) reduced flanker interference (exercise: 7.5 ± 5.5%; control: 10.2 ± 9.2%) and decreased P3 amplitude (exercise: 2.9 ± 2.7 μV; control: 3.7 ± 2.9 μV). Conclusion: These findings suggest positive affect moderates the cognitive and neurocognitive benefits of acute exercise, emphasizing the need to explore mood-related factors in exercise-cognition research to optimize exercise interventions.

POSTER SESSION I - 034 | WHAT DO WE SHARE? COMPARING APPROACHES TO PHYSIOLOGICAL SYNCHRONICITY IN DYADIC INTERACTIONS

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If and how physiological activity "synchronises" between two individuals (dyad) who interact is an intriguing yet understudied question. While existing research has shown synchrony to be context dependent, the calculation of synchrony is so far dominated by windowed cross-lagged correlations. Here we used a multi-modal dyadic dataset to investigate several methodological approaches to measuring shared information in two signals. Interactions of 38 dyads talking about two positive and two negative life events were recorded including skin conductance (SCL), Electrocardiogram (ECG), online calculated heart rate (HR), respiration. Based on standardized data we calculated Mutual Information, Phase Locking Value and Windowed Cross-correlations, and compared each output with calculations based on randomizations of the original data. We found that each method showed significant shared information between each of the two individuals' physiological activity measures, but that the level differed between methods. For Mutual Information, HR and SCL shared more information than ECG or respiration. For Phase Locking Value, HR, ECG and respiration showed higher information sharing compared to SCL. Windowed Cross-Correlations showed higher shared information for SCL compared to HR. Given that the different methods use different statistical perspectives on signal overlap, we can derive measurement specific suggestions for the analysis of synchrony. Future directions for this work include to compare the predictive value of the different synchrony measures for behavioral outcomes.

POSTER SESSION I - 035 | EMOTIONAL SUPPRESSION AND THE CARDIOVASCULAR CONUNDRUM: PSYCHOPHYSIOLOGICAL EFFECTS OF STIGMA IN LGB INDIVIDUALS

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The "Cardiovascular Conundrum" refers to a paradoxical autonomic profile—elevated vagally mediated heart rate variability (HRV) alongside increased total peripheral resistance (TPR)—previously documented in African American individuals. While some link this pattern to genetic factors, others highlight the potential role of repeated exposure to discrimination and chronic emotional suppression. To investigate this mechanism in a different minority group, we studied 24 LGB and 26 heterosexual participants, matched by age and sex, during rest and while recalling a stressful discriminatory event. Participants were then randomly assigned to either a control condition (no instructions) or an emotional suppression condition, where they were instructed to inhibit negative emotions during a 10-minute recovery period. As expected, both groups showed increased HRV ($F = .95$; $\eta^2 = .02$) and TPR ($F = 3.90$; $\eta^2 = .07$) during suppression. Notably, LGB participants exhibited the same physiological response even in the control condition, suggesting a spontaneous suppression tendency when exposed to stigma-related stress. Replicating this cardiovascular pattern in a different marginalized group supports the idea that minority stress can become biologically embedded. These findings underscore the need for health policies and interventions that address the physiological consequences of discrimination.
FUNDING: This research was supported by funding from the Italian Ministry of University and Research (MUR) through the PRIN 2022 program.

POSTER SESSION I - 037 | THE UPSIDE OF ANXIETY: IMPROVED SPATIAL NAVIGATION IN HIGH-TRAIT ANXIOUS INDIVIDUALS UNDER THREAT

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Spatial navigation is crucial for survival, particularly the ability to retrace routes and avoid danger. In two studies we investigated how aversive anticipations influence navigation in a virtual urban environment. Healthy participants with varying trait anxiety completed route-repetition and route-retracing tasks under safe and threatening conditions. Study 1 (N=48) examined behavioral performance using a screen-based virtual reality (VR) task with the threat of electric shocks in either day- or night-sky environments. Results showed an interaction between trait anxiety and instructed threat: while low-anxious individuals showed impaired route-retracing under threat, high-anxious individuals exhibited enhanced performance. This aligns with attentional control theory, suggesting that high-anxious individuals shift attention toward information relevant for escape strategies (e.g. running away). Study 2 (N=30) aimed to replicate these behavioral findings within an immersive virtual environment. To this end, we used a Meta Quest 3 VR-headset and recorded electrocortical activity (EEG) while the tasks were performed. Preliminary results confirmed that high-anxious individuals navigated more efficiently under threat, reflected in faster decision times without accuracy trade-off. No differences emerged between route-retracing and route-repetition. On a broader perspective, our findings highlight an often overlooked benefit of anxiety: its role in processing environmental information for adaptive coping strategies, ultimately preparing individuals for effective flight responses.

POSTER SESSION I - 040 | SONG FAMILIARITY RELIES ON EVIDENCE ACCUMULATION

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The cognitive processes related to familiarity remain largely unknown. One possibility is that familiarity judgements involve evidence accumulation, a decision-making process in which information is gathered over time until a threshold is reached. Previous work has identified a scalp-recorded signature of evidence accumulation called the central-parietal positivity (CPP). We built on this previous work and recorded electroencephalography (EEG) while participants listened to several melodies, instructing participants to respond as soon as the song felt familiar. A prominent CPP was noted, time-locked to decisions but also to individual notes in the melody. We then used linear regression to unmix overlapping neural responses and observed that the note-locked CPP increased in amplitude just prior to a familiarity decision. This result suggests that song familiarity relies on evidence accumulation, with individual notes in a familiar melody acting as “evidence”.
FUNDING: NSERC (RGPIN-2024-04848)

POSTER SESSION I - 041 | FAILURE-TRIGGERED CARDIAC RESPONSES: FIRST EVIDENCE FOR THE COMBINED EFFECT OF TASK IDENTITY-RELEVANCE AND INDIVIDUALS’ MINDSET

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University of Geneva

There is empirical evidence for both impaired and enhanced performance following initial failures. Drawing on self-symbolization theory, Brunstein (2000) suggested that the relevance of tasks for persons’ identity goals is a key factor in explaining these different effects. Moreover, Dweck's (1986) mindset theory posits distinct reactions to setbacks in dependence of persons’ beliefs in ability concept. Notably, neither of these two frameworks has yet been integrated or studied in relation to effort-related cardiovascular responses. We expected individuals’ mindset to moderate the effect of task identity-relevance on effort. In a between-persons design, N = 111 university students completed two tasks. All participants received failure feedback after a first identity-relevant task. Next, they performed a second task framed as either identity-relevant or -irrelevant. Effort intensity in the second task was assessed by cardiovascular responses, especially cardiac pre-ejection period (PEP). A regression analysis of cardiac PEP reactivity found support for the expected interaction effect between individuals’ mindset and task identity-relevance. However, that interaction was only significant for women: PEP reactivity was stronger, indicating higher effort, for women with a stronger growth mindset when the second task was identity relevant. By contrast, their fixed mindset counterparts tended to disengage—i.e. reduced PEP reactivity. These findings provide first evidence for the moderating of role of persons’ mindset on effort intensity after failure in an identity-relevant task.

POSTER SESSION I - 042 | NEURAL CORRELATES OF ENVIRONMENTAL REWARD PROCESSING AND IT’S RELATION TO PRO-ENVIRONMENTAL BEHAVIOR

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The reward positivity (RewP) is an event-related potential (ERP) derived from EEG signals that reflects the brain's responses to positive vs. negative outcomes, playing a key role in motivation. Prior research shows that the brain's reward system responds to eco-labels, but it remains unclear how rewarding environmental outcomes affect RewP amplitudes. This study examines differences in RewP amplitudes between environmental and non-environmental rewards and whether RewP predicts pro-environmental behavior. Participants completed two EEG tasks: a traditional reward task and an environmental reward task. Each trial offered a $0.25 gain or $0.13 loss. Afterward, participants could donate $0, $5, or $10 from their environmental task earnings to a local environmental organization. They also completed the New Ecological Paradigm (NEP) and Climate Change Anxiety Questionnaire (CCAQ). Data were analyzed using a 2 × 2 within-subjects ANOVA and correlations between RewP amplitude and donation amount. Data from 46 participants were

analyzed. Rewards produced greater RewP than non-rewards across both tasks; however, environmental outcomes elicited a larger difference between reward and non-reward applitudes, participant donation amount correlated with pro-environmental attitudes. These results suggest that environmental rewards engage neural reward systems and may influence sustainable behavior.
FUNDING: The Northern Michigan University McNair Scholars Program.

POSTER SESSION I - 044 | SOCIAL COOPERATION AND COMPETITION IS REFLECTED IN EVOKED AND INDUCED BRAIN RESPONSES DURING DYADIC GAMING

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Cooperation and competition are fundamental aspects of human social interaction. While humans are cognitively tuned to collaborate toward shared goals, they also navigate competing interests within social contexts. EEG hyperscanning offers a real-time window into how social roles and personal motivations influence neural processing during interaction. We developed a dyadic Pacman Game to simulate a naturalistic yet experimentally controlled environment by systematically modifying game rules. In this game, players jointly navigate a Pacman through a maze using an agreed-upon pictorial coding system. Each move requires sequential turns, with players alternating between sender and receiver roles. Our initial findings replicated previous results, showing that distinct cognitive and motivational demands of sender and receiver roles are reflected in alpha/beta oscillations and P3 components. Furthermore, introducing local competitive interactions within the game's collaborative framework, we observed that ERP and oscillatory brain activity differentiated between cooperative and competitive contexts across player roles. Together, our data demonstrate that dynamic role taking is a core mechanism of social coordination, systematically reflected in both evoked and induced brain responses. The dyadic Pacman Game thus showcases the potential of experimental games to uncover the psychological mechanisms underlying social behavior.
FUNDING: German Research Foundation (DFG) under Germany's Excellence Strategy; EXC2117-422037984 granted to Harald Schupp

POSTER SESSION I - 045 | DECODING MOTOR CONTROL IN GILLES DE LA TOURETTE SYNDROME: A PSYCHOPHYSIOLOGICAL EXPLORATION OF BETA BRAIN RHYTHMS

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Context: Beta frequencies are typically observed during movement execution and are known to be altered in certain movement disorders. However, few studies have explored these alterations in Gilles de la Tourette Syndrome (GTS). Given that difficulty in modulating motor responses characterizes this condition, observable frequency-based signatures may be observable and hint at motor control mechanisms in this disorder. Objectives: (1) Compare beta EEG activation during inhibition phases between a control group and a GTS group; (2) explore psychophysiological signatures specific to the GTS group during stimulus-response compatibility mixed with a motor inhibition condition. Method: A group of 17 adults with GTS was paired with 17 control participants based on age, sex, and handedness. Continuous EEG was recorded during a stimulus-response compatibility task with an inhibition condition. Beta frequency activity (13–30 Hz) was extracted within a 0–400 ms time window before and after motor response. Results: A higher beta amplitude was observed in the GTS group (Group: $F[1,32]=6,47$; $p<.05$), with a more prominent effect in the anterior frontal region during the motor inhibition condition (Group by Condition by Region: $F[1,32]=7,98$; $p=.008$). Conclusion: Previous studies have also reported increased beta activity in frontal regions in GTS, which is consistent with neuroimaging studies showing frontal overactivation in this population. Implications: These results could propose that beta-band EEG rhythm may serve as a psychophysiological marker of motor control processes in GTS.
FUNDING: Canadian Institute for Health Research

POSTER SESSION I - 047 | UPDATE ON THE CULTURALLY ADAPTED REMOTE-EEG PROTOCOL: ACCEPTABILITY, CONCERNS, AND RECOMMENDATIONS FROM HISPANIC/LATINE PARTICIPANTS

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Electroencephalography (EEG) aids our understanding of clinical disorders by identifying neural processes associated with risk, diagnosis, and treatment outcomes. However, generalizability of findings is limited as Hispanic/Latine individuals are underrepresented in EEG studies due to geographic, financial, and language barriers. To offset these barriers, bilingual and bicultural researchers culturally adapted our remote, home-based EEG protocol using the Ecological Validity Model (EVM). To date, the protocol has been piloted with 23 Hispanic/Latine participants. Acceptability ratings were collected via post-assessment surveys using Likert-ratings. Concerns and recommendations were collected via interviews and analyzed using content analysis. Preliminary findings show good or excellent satisfaction with the quality and ease of equipment (99%), participation and support (100%), and the protocol's ability to capture skills (100%). Similarly, participants agreed or strongly agreed with the EVM cultural adaptations: Spanish language (100%), persons (95%), metaphors (100%), content (100%), concepts (97%), goals (95%), methods (97%), and context (98%). Finally, content analysis indicated concerns about EEG side effects, EEG findings, ability to use electronics, and immigration. Recommendations included more information on EEG methods, continual reminders of participant rights, and culturally matched researchers in studies. This study will inform how to conduct culturally sensitive EEG

research with Hispanic/Latine communities to increase our understanding of clinical disorders.

POSTER SESSION I - 048 | STROKE VOLUME ESTIMATION COMPARING THE SRAMEK-BERNSTEIN METHOD AND THE KUBICEK METHOD

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Impedance cardiography noninvasively estimates stroke volume (SV; ml/heartbeat), which enables calculation of cardiac output and total peripheral resistance. The Kubicek equation estimates SV using the inter-electrode distance between the 2 inner (recording) electrodes in a 4-electrode configuration. The Sramek-Bernstein equation uses height, weight, and thoracic length (17% of height), but not inter-electrode distance. To evaluate agreement between these 2 methods, we analyzed data from two tasks (TV & Affective Environment or AE) in one sample where subjects selected affective material to view (positive, negative or neutral). AE (n = 48) and TV (n = 47) had 5-10 baseline and 10-20 task epochs per subject (30 sec each). We evaluated SV agreement across methods using the Limits of Agreement (LoA) method, commonly used to compare two methods of estimating the same clinical outcome. LoA plots showed mean SV (across methods) on the x-axis and SV difference on the y-axis. Because results were similar across TV and AE, we combined TV & AE baseline and TV & AE task epochs. Both TV and AE showed high inter-method agreement: 90.9% (baseline) and 91.8% (task) of epochs fell within 95% LoA. Only 3 participants had epochs outside the 95% LoA. Baseline and task epochs showed a mean SV difference of 19.0 ml and 17.6 ml, respectively, from mean baseline SV of 124.7 ml and mean task SV of 123.9 ml. These results suggest the less-often used Sramek-Bernstein method is a viable alternative to the Kubicek method for estimating SV, especially when inter-electrode distance is not available.

POSTER SESSION I - 049 | PHYSIOLOGICAL AROUSAL AND SENSE OF AGENCY IN THE CONTEXT OF OTHERS' PAIN-RELATED VOCALIZATIONS

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Chiba University

Accurately attributing responsibility for actions that harm others is essential for maintaining appropriate social behavior. The subjective feeling that one has caused an outcome, referred to as the sense of agency, has been extensively studied in relation to physical sensory consequences such as tones or visual events. However, the underlying mechanisms of agency in interpersonal contexts—particularly when one's action causes pain to another person—remain unclear. Empathy for others' pain may play a mediating role in this process. The present study investigated the relationship between empathy and the sense of agency when one's action produces another person's pain-related vocalizations. Specifically, we adopted the Intentional Binding paradigm, in which the perceived temporal interval between an action and its outcome is typically compressed, serving as an implicit measure of agency. Additionally, we recorded skin conductance responses (SCRs) as an index of physiological arousal associated with empathy for pain. However, SCRs were larger for pain-related vocalizations not caused by participants' actions than for those following their actions. These findings lead us to discuss how a reduction in bodily arousal is involved in the mechanisms of the sense of agency when one's actions cause pain to others.
FUNDING: JSPS KAKENHI Grant Number JP23K02909

POSTER SESSION I - 050 | THE INTERACTION BETWEEN PAIN AND SELECTIVE ATTENTION IS INFLUENCED BY INDIVIDUAL DIFFERENCES IN PAIN CATASTROPHIZING AND COGNITIVE PERFORMANCE

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The interaction between pain and selective attention may lead to pain inhibition or altered cognitive performance, reflecting the prioritization of cognition or pain, respectively. In this regard, previous studies show conflicting findings, which may be explained by individual differences in cognitive and pain-related factors. The present study examines whether individual differences in task performance and pain catastrophizing influence event-related brain potentials related to pain (P260) and selective attention (N2pc), when painful stimuli are delivered during a selective attention task. Sixty-four individuals completed a visual search task with varying task demands (0,2,3,4,5 items), while painful electrical stimuli were delivered randomly on the leg. Task performance, N2pc slope (differential amplitude between 5 and 2 items), and P260 amplitude were used as dependent variables. Mean task performance in no-pain conditions and pain catastrophizing scores were used as moderators. The results show that the P260 amplitude was reduced by task execution ($p<0.001$), while pain did not alter N2pc slope ($p=0.23$). Accordingly, task performance was not altered and was even improved by pain ($p=0.009$). In addition, higher task performers showed greater reductions in P260 amplitude during task execution, while higher pain catastrophizers exhibited a greater increase in N2pc slope during pain. These findings highlight the complex influence of cognitive and pain-related factors on the prioritization of pain or cognition during pain-cognition interactions.
FUNDING: NSERC, QBIN, QPRN

POSTER SESSION I - 051 | INHIBITION OF PAIN-RELATED BRAIN ACTIVITY BY WORKING MEMORY AND MODULATION OF WORKING MEMORY PROCESSES BY PAIN ARE INFLUENCED BY INDIVIDUAL DIFFERENCES IN COGNITIVE PERFORMANCE AND PAIN CATASTROPHIZING

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Previous studies show conflicting findings on the prioritization of pain or cognition when painful stimuli are applied during the execution of a working memory task. This may be explained by individual differences in cognitive and pain-related factors that are not accounted for, but this has been overlooked. The objective of this study is to examine whether individual differences in working memory performance and pain catastrophizing influence event-related brain potentials underlying pain (P260) and working memory (CDA), while participants are executing a change detection task (2 or 4 items) with randomly delivered painful stimuli applied on the leg. Seventy-nine participants were recruited in the study. Task performance, CDA amplitude, and P260 amplitude were used as dependent variables. Mean task performance in conditions without pain and pain catastrophizing scores were used as moderators. The results indicate that the P260 amplitude was reduced by task execution (p0.05). Besides, greater reductions of the P260 amplitude were observed during task execution in individuals with better performance, while individuals with higher pain catastrophizing exhibited a greater decrease in CDA amplitude in trials with painful stimuli. These results show that cognitive performance and pain catastrophizing influence the pain-cognition interaction and may partly contribute to determine whether pain or cognition is prioritized.
FUNDING: 1-NSERC (Canada) 2-QPRN (Quebec) 3-QBIN (Quebec)

POSTER SESSION I - 052 | ALPHA SUPPRESSION OBSERVED IN A NOVEL VISUAL SEARCH TASK: NO EVIDENCE FOR MODULATION BY LOAD, FACIAL DISTRACTOR, OR REJECTION SENSITIVITY

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Rapid attention to social feedback guides behavior and helps to sustain meaningful relationships. Rejection sensitivity (RS) is linked to maladaptive responses to rejection and predicts social anxiety symptoms in social anxiety disorder (SAD). Perceptual-load effects on occipital alpha suppression, a neural index of attentional engagement, are well documented in SAD but have not been examined in RS. Identifying whether RS is linked to the same load-sensitive markers as SAD or follows a distinct pattern, will clarify whether RS is a subclinical manifestation of the same phenomenon. Thirty-four undergraduates performed a visual-search task during which they located a target letter at low or high perceptual load while a task-irrelevant neutral face or scrambled image appeared at fixation. Linear mixed models tested main and interactive effects of load, distractor, and RS group. Although groups differed in RS, alpha power was not moderated by load, facial distractors, or RS. This finding suggests that load-sensitive markers of attentional engagement do not track RS. It is possible that restricted symptom range of the non-clinical sample in combination with task limitations might have contributed to null effects, and future research might consider examining people with SAD.

POSTER SESSION I - 053 | IMPACT OF SOCIAL ANXIETY ACROSS SOCIAL CONTEXTS AND CONGRUENCY

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Cognitive control N2 and P3 ERP components are often modulated by anxiety traits. Yet, how social anxiety interacts with social context to shape these processes remains unclear. This study explores how social evaluation affects cognitive control across different levels of social anxiety. Participants (N = 79) completed a flanker task in a non-social (Alone) setting, followed by a social evaluation (Social) context where their performance was evaluated by the experimenter. Whole scalp mass univariate statistics were used. Preliminary analyses replicate enhanced N2 and P3 amplitudes for incongruent than congruent trials, but this congruency effect was not influenced by social evaluation. Distinct anxiety correlations emerged between the Alone and Social conditions. In the Alone condition, social anxiety was associated with enhanced P3-like ERPs (post-300 ms, parietal) during congruent trials, and heightened N2-like ERPs (~200 ms, right-frontal) during incongruent trials. In the Social condition, social anxiety increased N1-like amplitudes in congruent trials (~100 ms, left frontal and central) and P3-like ERPs (~300 ms, left parietal). Importantly, during incongruent trials in the Social condition, social anxiety did not modulate ERP amplitudes. This pattern suggests that evaluative pressure may override anxiety-linked top-down differences in control processing during demanding conditions. Of note, the correlations were distributed slightly differently from the classic N2 and P3 topographies. Ongoing data collection (target N = 150) aims to confirm these patterns.
FUNDING: NERSC (Natural Sciences and Engineering Research Council of Canada)

POSTER SESSION I - 054 | LATENT STATE TRAIT MODELS REST FRONTAL ASYMMETRY WITH SHORT DATA COLLECTION INTERVALS : EXPLORATORY APPROACH

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Frontal asymmetry as a feature of resting state electroencephalography (EEG) has been discussed for over 30 years as a correlate of stable personality traits. Associated traits include constructs of approach and withdrawal motivation, as well as behavioural activation and inhibition. This framework of associated traits has since been expanded to describe a structure of latent traits which are superimposed by state-dependent fluctuations. To calculate a model of latent traits and states at least two occasions of measurement are required, which have previously been separated by several weeks. The goal of this study was to explore the latent state-trait structure of frontal asymmetry measures derived from three occasions of measurement on the same day. A latent trait derived from the models was further investigated regarding whether it could be associated with trait

sensitivity of the Behavioural Activation System (BAS) as measured through different questionnaires. Variations of latent-trait and latent-state-trait models, some including method-factors were analysed through structural equation modelling (SEM) regarding their fit to the data. While a latent state-trait model including method-factors for two resting conditions of opened- or closed-eyes was found to provide the relative best fit to the data, absolute fit-indices did not indicate adequate model fit for any of the investigated models. The latent trait influencing frontal asymmetry as postulated by the investigated models did not show significant correlations with trait-BAS sensitivity as derived from questionnaires.

POSTER SESSION I - 055 | TWO COMPONENTS OF SENSORY PROCESSING SENSITIVITY: HOW VISUAL SALIENCY AND EMOTIONAL VALENCE INFLUENCE PUPIL REACTIONS OF HIGHLY SENSITIVE PERSONS.

Beata Pacula-Lesniak, Michał Kuniecki
Jagiellonian University

Sensory processing sensitivity is a biologically-determined increased susceptibility to environmental inputs. It includes perceptual sensitivity - being able to notice subtle stimuli and being more easily overwhelmed by intensive stimuli - and affective sensitivity, i.e. sensitivity to the emotional clues. The current study aimed to examine the impact of emotional load, visual saliency, and their interaction on the pupil reactions among people varying in the sensory processing sensitivity. We collected data from 105 participants (55 women) in a task entailing free viewing of 120 emotional images (negative, positive and neutral). We manipulated the visual saliency of the key objects to obtain two conditions: saliency increased and unchanged. Participants' sensory processing sensitivity was measured using the Highly Sensitive Person Scale for research purposes. More visually salient key objects evoked more pronounced pupil constriction. We also observed differences in pupil size depending on picture's emotional load - the highest dilation to negative pictures, then positive, and lowest to neutral. Importantly, sensory processing sensitivity modulated observed effects. Highly sensitive persons had more dilated pupils in response to negative stimuli than participants scoring lower on sensory processing sensitivity, but only in natural conditions. When the perceptual salience was increased, the observed effect disappeared. Moreover, highly sensitive persons demonstrated weaker pupil adaptation – reduced constriction - in response to stimuli of increased salience.
FUNDING: This work was supported by the Polish National Science Centre (grant number 2021/41/N/HS6/04490).

POSTER SESSION I - 056 | CARDIOVASCULAR HEALTH AND TRAUMA IN YOUNG WOMEN: THE CHaT STUDY

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Early life adversity is known to impact physical and mental health outcomes later in life, particularly cardiovascular health. Recent literature has indicated young women are at increasing risk for developing cardiovascular disease, with alarming rates of cardiovascular-related hospitalizations. In samples of midlife and older women, early life adversity is positively associated with biomarkers of cardiovascular disease risk, including pulse wave velocity, a measure of arterial stiffness. However, traditional methods of measuring pulse wave velocity are often time consuming, costly, and needs a trained technician. In an ongoing study, we measured pulse wave velocity by utilizing a novel, non-invasive, and previously published, dual impedance cardiography technique. Exclusionary criteria included diagnosed cardiovascular disease or taking medications that interfered with cardiac response (e.g., beta-blockers). Following a 5-minute acclimation, participants underwent a 10-minute resting baseline during which pulse-wave velocity was measured. Participants completed demographic, along with the Childhood Trauma Questionnaire, a self-report retrospective measure that captures multiple aspects of early life adversity. In sample of 90 young women (Mage = 18.94 years SD = 0.71; 70.7% White), preliminary results indicated a positive significant correlation between childhood sexual trauma and pulse wave velocity ($r = .37$, $p = <.01$). Future studies should utilize similar methods (i.e., spot electrodes) to explore cardiovascular effects of early life adversity across the lifespan.
FUNDING: Psi Chi Honors Society University of Alabama

POSTER SESSION I - 057 | SAVOR THE NEW? A SINGLE SESSION OF SAVORING DOES NOT ENHANCE LPP TO PLEASANT IMAGES BEYOND PASSIVE VIEWING

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Savoring is a present-focused emotion regulation strategy aimed at enhancing positive affect. Previous research has shown that savoring increases emotional processing of pleasant stimuli, as reflected by larger late positive potential (LPP) observed for savored compared to viewed-only pleasant images. While most research examined the LPP during the savoring task, the present study investigated whether a single savoring session could yield a generalization effect – enhancing responses to pleasant images not previously savored. Specifically, this study examined whether savoring, compared to passive viewing, would increase LPP to pleasant stimuli presented before and after the training. A sample of 61 young adults underwent electroencephalographic (EEG) recording across all phases of the study. First, participants passively viewed pleasant and neutral images. Then, they were randomly assigned to a savoring group (n = 32), which both savored and viewed pleasant and neutral images, or a control group (n = 29) that only passively viewed them. A second passive viewing task followed, encompassing images matched for valence and arousal ratings to those in the first passive viewing task. Results showed a significantly larger LPP amplitude for pleasant than neutral images, with this effect being more pronounced during the post- training passive viewing task. However, this occurred regardless of the group condition, suggesting that a single savoring session does not produce

additional benefits in emotional processing beyond those elicited by repeated exposure to pleasant stimuli.
FUNDING: National Recovery and Resilience Plan (NRRP) funded by the European Union - NextGenerationEU– Project Numbers: P20223PTH4, adopted by the Italian Ministry of Ministry of University and Research (MUR).

POSTER SESSION I - 058 | DISSOCIABLE NEURAL ACTIVITY PATTERNS REFLECT DISRUPTION OF DISTINCT MENTAL OPERATIONS DURING SYMBOL DIGIT MODALITIES TEST PERFORMANCE IN MULTIPLE SCLEROSIS

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University of Buffalo

The Symbol Digit Modalities Test (SDMT) is a short test of cognitive processing speed that has been clinically validated for use in Multiple Sclerosis (MS), a progressive neurodegenerative disorder. However, the neural operations underlying SDMT performance in MS are not well understood. To address this knowledge gap, we have developed a novel computerized SDMT-event-related potential (cSDMT-ERP) paradigm to identify biomarkers of processing speed dysfunction in people with MS (PwMS) compared to healthy controls (HCs). PwMS exhibited a redistribution of N2 amplitude, and attenuated P3 amplitude compared to HCs during task performance. A factor analysis applied to the ERP data produced three distinct latent variables, and we examined the association between these latent variable scores and clinically relevant measures. Reduced amplitude of P1, frontal N2, and parietal-occipital P3 (reflecting a higher factor 1 score) was associated with poorer SDMT performance (slower response speed). Reduced frontal-central N2 amplitude with concomitant enhancement of central P3 amplitude (higher factor 2 score) was associated with better SDMT performance. Finally, more pronounced N1 amplitude (higher factor 3 score) was associated with heightened depression symptoms. These indices represent the neural underpinnings of SDMT performance (factor 1), neural compensation (factor 2), and the impact of depression symptoms (factor 3). The findings indicate that cSDMT-ERP measures can serve as sensitive and specific biomarkers of disease impact in MS and extend the clinical utility of the SDMT.
FUNDING: National Multiple Sclerosis Society

POSTER SESSION I - 059 | ERROR MONITORING AND OCD SYMPTOMS: THE IMPACT OF A WORRY INDUCTION ON THE ASSOCIATION BETWEEN OCD SYMPTOMS AND ERNAMPLITUDE

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The compensatory error monitoring hypothesis (CEMH) suggests anxious individuals generate a larger error-related negativity (ERN; EEG index of error monitoring) to maintain adequate performance. Although CEMH has been mostly evaluated through worry, obsessive-compulsive disorder (OCD) symptoms also associate with error monitoring indices. A less addressed aspect of CEMH is the role of state worry in the association between OCD symptoms and ERN. The current study aimed to address this gap by examining the association between OCD symptoms and the ERN and performance following a worry induction. 136 females (M=19.26 years-old) completed a Flanker task while undergoing continuous EEG and were randomized to either think about their weekend (neutral induction; n=71) or one of their primary worries (worry induction; n=65). Regressions were used to evaluate the impact of total OCD symptoms (Obsessive-Compulsive Inventory-Revised; M=15.57, SD=10.63), induction condition, and the OCD-by-condition interaction on ERN, RT, and accuracy. There was a significant OCD-by-condition interaction effect (B=-.12, SE=.06, p=.04) on ERN, such that increased OCD symptoms were associated with larger ERN amplitude following the worry induction, but not the neutral induction. There was a significant effect of OCD symptoms on RT such that increased symptoms were associated with slower RT (B=-.17, SE=.71, p=.02). There were no significant effects on accuracy. Results align with CEMH as OCD symptoms were associated with exaggerated error monitoring and inefficient performance when worries were present.
FUNDING: NSF GRFP (Lilianne Gloe)

POSTER SESSION I - 060 | A BRIEF POSITIVE-AFFECT INTERVENTION FOR WORRY: PREDICTION OF TREATMENT OUTCOME USING THE LPP

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Texas A&M University

Worry is a transdiagnostic symptom that exerts the highest physical, emotional and financial toll of all anxiety dimensions. Treatment response rates for worry are poor, in part because worry is characterized by aberrant operantly conditioned reward processing, whereas negative-emotion focused therapies target classically conditioned threats. That is, when patients worry, they experience temporary relief (positive affect) when anticipated negative events do not occur, maintaining worry. Patients with blunted electrocortical processing of negative pictures, as measured by late positive potentials (LPPs), do poorly with negative-emotion focused treatment. Positive-emotion focused treatments may be well-suited to these patients because they do not rely on extinction of negative emotional responses. Here, we sought to determine whether the LPP could predict worry reduction after a two-session positive affect intervention designed by our group (Short-term Methods for Increasing Life's Enjoyment, SMILE). College students with internalizing symptoms were assigned to SMILE (n = 24) or Study Tips (ST), a control condition (n = 27). Participants performed a passive picture-viewing task during EEG before weekly SMILE/ST treatment. Patients in the SMILE group with smaller baseline Neg-Neut LPPs showed greater reductions in worry (Group X Neg-Neut LPP, $\beta = 0.21$, $p = 0.026$). SMILE might be an efficacious treatment for worry, particularly for those that are likely to respond poorly to negative-emotion focused treatment, indicating its potential to fill a gap in current treatment options.
FUNDING: Texas A&M's President's Excellence Fund X-Grant (to AM)

POSTER SESSION I - 061 | EEG CORRELATES OF COGNITIVE LOAD AND EMOTIONAL REACTIVITY IN A NOVEL TRAUMA FOCUSED INTERVENTION

Jens Bernhardsson, Anna Bjarta
Mid Sweden University

Intrusive traumatic memories are a core symptom of PTSD and are associated with the development and maintenance of the disorder. Recent findings suggest that interventions combining memory reactivation and cognitive load can disrupt memory reconsolidation, potentially reducing the emotional intensity of intrusive memories. This study explored electrophysiological markers of cognitive and emotional processing during such an intervention. Participants suffering from intrusive memories were randomly assigned to an intervention or waitlist control group. Electroencephalography (EEG) was recorded continuously during the intervention, which included memory reactivation and three phases of increasing visuospatial cognitive load. Cognitive load was indexed by the theta/alpha ratio (TAR), and emotional reactivity was measured by frontal alpha asymmetry (FAA) during memory reactivation. Results showed a significant main effect of time on TAR, with increases corresponding to task phases presumed to induce higher cognitive load. FAA shifted from right dominant to more left dominant activity across sessions, suggesting reduced avoidance related emotional responses. Furthermore, TAR and FAA alterations were observed alongside declines in self-reported distress and trauma related symptoms. These findings suggest that TAR and FAA may serve as sensitive biomarkers of intervention effects and support further investigation into the intervention's mechanisms of action.

POSTER SESSION I - 062 | INVOLVEMENT OF PHYSIOLOGICAL REACTIVITY AND INTEROCEPTION IN EMOTIONAL EXPERIENCE: STUDY IN A TRAUMATIC BRAIN INJURY POPULATION

Alice Bodart, Mandy Rossignol
University of Mons

Emotional experience relies on different components, including physiological reactivity (PR) and the awareness of this reactivity corresponding to interoception. The role of body information in emotional construction has been debated for over a century. To investigate this, we studied emotional experience in individuals with traumatic brain injury (TBI), who typically show reduced PR and interoception. In a first study, we assessed 26 men with TBI and 26 healthy men. PR was measured using electrodermal activity and heart rate variability during emotional films. Interoceptive sensibility was assessed with the MAIA questionnaire, and interoceptive accuracy with a heartbeat counting task (HBCT). Results showed a dissociation between emotional experience and PR following TBI, with emotional experience being preserved but reduced PR. Furthermore, individuals with TBI demonstrated lower interoceptive sensibility. These findings suggest that emotional experience construction could rely on other components when PR and interoception are diminished. However, the validity of interoceptive accuracy measures, such as HBCT, has been questioned, and they appear unsuitable for the TBI population. To address this limitation, we developed a novel interoceptive respiratory task, which is currently being tested in participants with TBI. With this second study, we aim to investigate more precisely the impact of interoceptive dysfunction on the construction of emotional experience. Preliminary results from this ongoing study will be presented at the congress.

POSTER SESSION I - 063 | EFFORT-BASED REWARD PROCESSING, PERIPHERAL SYSTEMS, AND LINKS WITH MAJOR DEPRESSION

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Assessment of effort-based reward processing (EBRP) has advanced understanding of deficits underlying prevalent psychopathology like depression. Substantial work has outlined the neurobiological processes underlying EBRP that interface with peripheral physiology (e.g., pro-inflammatory cytokines) to evaluate the cost of reward pursuit. The current study highlights the utility of a novel task to assess multiple event-related potentials (ERPs) linked to EBRP. In an initial study, we found that effort expenditure exerted a cost on anticipation and valuation of rewards while enhancing allocation of attention to effort completion cues. In a follow-up study, compared to age-matched controls, depressed participants were characterized by reduced differentiation between high and low effort conditions in reward anticipation and effort cost valuation while showing reduced reward valuation following high effort. Finally, we administered the task to a sample selected for dimensional depressive symptoms alongside measurement of pro-inflammatory cytokines. Results revealed that elevated inflammation predicted depression more effectively in participants with reduced modulation of EBRP ERPs. We also found a stronger link between peripheral inflammation and these ERPs among participants reporting greater lifetime trauma, suggesting trauma exposure enhances neural sensitivity to inflammation. Collectively, this suggests a complex network of interacting systems that govern motivated reward pursuit wherein deficits promote the development and maintenance of disorders like depression.
FUNDING: NIMH T32 MH 093311-11 NIMH T32 MH 018869

POSTER SESSION I - 064 | NEURAL INDICES OF ATTENTIONAL BIASES IN TYPES OF ANXIETY FROM OSCILLATORY AND ERP ANALYSES

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Weber State University

The present study used oscillatory analyses and event-related potentials (ERPs) to measure the role of anxious apprehension and anxious arousal in how much individuals' attention (operationally defined as theta/beta ratio and the amplitude of the N2pc component) was captured by the presence of negative stimuli. Eighty students from introductory psychology courses completed a dot-probe task with word stimuli grouped by valence and self-report measures of anxiety. Participants with anxious arousal were biased toward highly threatening information, while those

with anxious apprehension were biased toward mildly threatening information, as indicated by greater activation for parietal and frontal regions, respectively. This supports prior literature and furthers our understanding of how TBR and attentional biases relate to dual-anxiety. Additionally, anxious arousal was associated with increased N2pc amplitudes to the word stimuli, supporting research that has associated this type of anxiety with heightened bottom-up attention. Importantly, we only found effects of anxiety on attentional biases and neurobiology with our dual-anxiety measures. When analyses were conducted with a unitary measure of trait anxiety, no significant effects were found. This supports a more nuanced approach to studying anxiety, which considers multiple dimensions of anxiety symptoms, rather than treating anxiety as a unitary construct.

POSTER SESSION I - 065 | NEIGHBORHOOD SOCIAL COHESION MAY BUFFER NEURAL BURDEN OF SOCIAL ANXIETY ON WORKING MEMORY

Charlotte Cannizzo
Cornell University

Social anxiety—marked by persistent fears of negative evaluation—affects nearly 20% of university students and is linked to deficits in executive functions like working memory. Few studies have examined protective factors that may buffer these effects or their neural mechanisms. We investigated whether access to supportive social resources modulates the neural correlates of social anxiety during a working memory task. Thirty-seven healthy adults (Mean Age: 23 ±5, Female N = 19) completed a spatial N-back task during fMRI scanning. Social anxiety symptoms and perceived neighborhood social cohesion (PNSC) were measured and analyzed in relation to blood oxygen level-dependent (BOLD) signals. Higher social anxiety was associated with heightened task-related BOLD activation (3-back + 0-back > implicit baseline) in regions implicated in cognitive control and spatial attention, including the posterior cingulate cortex, precuneus, and dorsal anterior cingulate cortex. This effect was identified using whole-brain covariate analysis with SIAS scores ($z > 2.3$, $p < .05$, cluster-corrected). Exploratory mediation analyses were conducted outside FSL using contrast estimates extracted from this cluster, PNSC scores, and self-rated task difficulty. Higher PNSC predicted decreased activation in this cluster, which was associated with lower self-rated task difficulty, revealing a significant indirect pathway (Indirect effect: –.006, 95% bootstrapped CI: [–.0149, –.001]). These findings suggest that supportive social environments may generally reduce neurocognitive burden on working memory.

POSTER SESSION I - 066 | AVOIDING POSITIVITY TO GET BETTER AT AVOIDING PUNISHMENT

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Decades of research suggest that individuals with Major Depressive Disorder (MDD) actively avoid positive and rewarding stimuli. Recent psychophysiological work suggests that MDD is associated with a reduced Reward Positivity (RewP) ERP component; however, the functional implications of this reduced reward signal remain undefined. In a recent Magnetoencephalography (MEG) study, we found that individuals with MDD showed reduced ventromedial prefrontal cortex activity to rewards, yet retained the capacity for reward learning despite showing impaired punishment avoidance (i.e., diminished NoGo learning). Interestingly, anhedonic symptoms were associated with increased ventromedial activation, suggesting a complex interplay within MDD. Here, we report a novel finding: ventromedial activity significantly predicted future aversive learning (NoGo: $r(50) = 0.32$, $p = 0.03$). This finding was robust across alternative measures and calculations of aversive learning. Here we advance a novel hypothesis that this pattern reflects the use of a task set (or "model-based strategy") focused on avoidance. In this context, the value of a reward lies not in hedonic benefit but in signaling that a worse outcome was avoided. In anhedonia, then, rewards are used to inform the counterfactual ("the other option was the bad choice"). We outline directions for future experiments to test this novel hypothesis.
FUNDING: NIMH RO1MH119382-01

POSTER SESSION I - 067 | MEASURING LATENT ANXIETY SENSITIVITY AND ITS ASSOCIATION WITH PTSD AND SUICIDE: A PSYCHONEUROMETRIC APPROACH

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Anxiety Sensitivity (AS) is a transdiagnostic risk factors for posttraumatic stress disorder (PTSD) and suicide. Little research has identified neurophysiological correlates of AS. The current study leverages the psychoneurometric approach in which latent AS is measured at the neurophysiological, behavioral, and self-report level. Participants (n = 179) completed an emotional interrupt task and viewed validated images depicting AS-related fears and neutral images from the International Affective Picture Set (IAPS). Latent AS was measured using the late positive potential (LPP) while viewing the AS images, behavioral accuracy to the target during AS image presentation, and self-report scores on the ASI–3. Latent variables and path analyses testing the association between latent AS and PTSD and suicidal ideation were fit using the lavaan package in R-studio. The latent AS construct with the AS LPP loading fixed demonstrated good model fit [$\chi2\ (5) = 5.38$, $p = .371$; TLI = .99; CFI = .99; RMSEA = .02, 90%CI[.00, .12]; SRMR = .04] and factor loadings for AS behavioral accuracy (estimate = -0.03, SE = .02, z = -1.70, p = .09) and AS self-report (estimate = 2.80, SE = 1.01, z = 2.77, p = .006). Path analyses revealed a significant association between latent AS and both PTSD symptom severity ($\beta = .67$, $p < .001$) and suicidal ideation ($\beta = .46$, $p = .001$). Results indicate the utility of the psychoneurometric approach to index the latent AS construct and provides an innovative perspective for future work seeking to better understand the associations between AS, PTSD, and suicide.

POSTER SESSION I - 068 | TIME COURSE OF EMOTIONAL TARGET DETECTION IN HIGH AND LOW WORRIERS

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Early orienting and later sustained attentional engagement with threat stimuli are potential components of attention bias in anxiety. The present study investigated attention bias patterns using a visual search task (VST), examining early (P100 amplitude) and later (sustained posterior contralateral negativity, SPCN) event-related potentials (ERPs), as well as reaction time (RT) measures, in a sample of high (n = 23) and low worriers (n = 29), all reporting low levels of depression symptoms. Common visual search ERP patterns in anxious populations can be larger, more positive P100 amplitude and/or larger, more negative SPCN amplitude prompted by threat or emotionally arousing stimuli when compared to controls. If high worriers show disrupted early or later attentional processing, P100, SPCN, and/or RT patterns should differ from controls in response to threat stimuli. Results support SPCN but not P100 amplitude or RT differences in threat processing. Specifically, while earlier (P100 amplitude) and later (RT) processing were similar across groups, high worriers exhibited weaker contralateral sustained later processing (SPCN amplitude) in response to threat targets surrounded by neutral distractors. These findings are consistent with attentional dysregulation theories for anxious populations and have implications for targeted clinical interventions.

POSTER SESSION I - 069 | THE EFFECTS OF RUMINATION AND POSITIVE DISTRACTION ON SELF-REFERENTIAL PROCESSING IN SUBCLINICAL DEPRESSION: AN ERP STUDY

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Keio University

Maladaptive self-referential thinking is a key mechanism in emotional disorders such as depression. This study investigated whether self-referential neural responses, as indexed by the late positive potential (LPP)—a physiological marker of attention to emotionally salient self-related content—vary depending on one's emotional state induced by rumination or positive distraction, and whether depressive and ruminative tendencies modulate these fluctuations. Fifty-one healthy adults participated in an EEG experiment using a self-referential encoding task (SRET) with emotionally valenced words. Participants completed the task three times: after rumination, after positive distraction, and again after rumination. LPP amplitudes were extracted in response to self-referential judgments of positive and negative words. Compared to post-rumination, positive distraction increased LPP amplitudes for positive words and decreased amplitudes for negative words, but only among individuals with higher depressive tendencies. Behaviorally, these individuals also showed more adaptive judgments (e.g., endorsing positive words) after distraction. Furthermore, the distraction-related increase in LPP to positive words was positively correlated with ruminative brooding tendencies. These findings suggest that emotional distraction can transiently modulate self-referential attention at the neural level in individuals with higher depressive and ruminative tendencies. Results highlight LPP as a promising index of emotionally driven shifts in self-related cognitive processing.
FUNDING: Japan Society for the Promotion of Science (JSPS), Grant-in-Aid for Challenging Exploratory Research (JP22K18264, PI: Satoshi Umeda)

POSTER SESSION I - 070 | ADVANCING SPATIOTEMPORAL NEUROPHENOMENOLOGY: EFFECTS OF MULTIPLE PSILOCYBIN TREATMENTS ON CONSCIOUSNESS AND BRAIN DYNAMICS IN OBSESSIVE-COMPULSIVE DISORDER THROUGH A MULTIVERSE DYNAMIC FUNCTIONAL CONNECTIVITY ANALYSIS

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Spatiotemporal neurophenomenology seeks to bridge the dynamic organization of brain activity with the structure of subjective experience, offering a novel framework for understanding psychopathology and therapeutic change. Classic psychedelics such as psilocybin are uniquely suited to this approach, given their capacity to drastically alter brain dynamics and consciousness. Here, we examined static and dynamic functional connectivity (sFC, dFC) changes from baseline to post-treatment following repeated psilocybin administration (up to eight sessions) in individuals with obsessive-compulsive disorder and their association with non-ordinary states of consciousness during those sessions. dFC was computed using a sliding-window clustering approach embedded within a multiverse framework. Canonical correlation analyses and permutation testing assessed multivariate associations between neural dynamics and phenomenological reports. Initial results show that greater 5D-ASC scores were associated with enhanced sFC between the default mode network and subcortical regions, alongside attenuated increases between control, dorsal attention, and salience networks. Multiverse analyses revealed several robust dynamic connectivity pipelines. Full dFC results and neurophenomenological associations linking the proportion of time spent in distinct brain states to subjective experience will be presented. These findings advance spatiotemporal neurophenomenology by demonstrating how drug-induced changes in experience relate to flexible reorganization of brain dynamics during psychedelic treatment.

POSTER SESSION I - 071 | MENTAL HEALTH LABELS AND EMOTIONAL PERCEPTION: EFFECTS OF "DEPRESSION" LABELS ON FACE PROCESSING AND MEMORY

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Swarthmore College

Mental health labels like "Depression" can shape how individuals perceive, evaluate, and remember others' emotional expressions.

This study examined how diagnostic labels influence emotion recognition, perceived emotional intensity, and memory, using a multi-method approach with event-related potentials (ERPs), behavioral tasks, and individual difference measures. Thirty-six participants viewed emotional facial expressions (sad, neutral, happy) paired with either a "Depression" or "NO Depression" label and rated the perceived emotion (sad, neutral, happy) during EEG recording. In subsequent tasks, they rated the emotional intensity of the same faces without labels, completed a surprise memory test, and individual difference surveys (e.g. PHQ-9). Results revealed that faces labeled "Depression" were categorized with lower accuracy and slower reaction times, especially when the expression was incongruent with the label (e.g., happy faces). Ratings of emotional intensity were also biased by earlier label exposure, even when labels were no longer visible. Memory accuracy was highest when label and expression were stereotype-congruent (e.g., sad face labeled "Depression") and lowest for happy faces labeled "Depression". ERP components (N170, P200, P300, N400) were modulated by label–expression incongruence, particularly or happy faces labeled "Depression", and by participant PHQ-9 depression scores. These results suggest that diagnostic labels activate schemas that bias perception and memory, highlighting how stigma from nonvisible labels shapes social cognition.

POSTER SESSION I - 072 | TRAIT AND STATE INFLUENCES ON MEASUREMENT OF FRONTAL ALPHA ASYMMETRY IN ADHD

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Frontal alpha asymmetry (FAA) – the difference in alpha power between the hemispheres – reflects motivational direction and affective processing. Rightward FAA is associated with approach behavior commonly observed in attention-deficit/hyperactivity disorder (ADHD), though within-diagnosis heterogeneity and experimental design contribute to inconsistent findings. The current study seeks to clarify lateralization patterns in ADHD and examine how trait-based emotionality interacts with state-based experimental task in a sample of 220 children (nADHD = 97). Measurement of trait emotionality was obtained from the Temperament in Middle Childhood Questionnaire (TMCQ), a behaviorally-rated measure of emotional reactivity and regulation. 64-channel EEG was recorded during resting-state and a passive-viewing picture task demonstrated to elicit positive/approach and negative/withdrawal emotion. Latent profile analysis using the TMCQ identified 1) a 'regulated' ADHD profile with emotional responding similar to controls and 2) a 'dysregulated' ADHD profile with high negative affect. Linear mixed models identified an effect of task where children produced a more rightward asymmetry in resting state ($F(2,318) = 3.12$, $p = .047$). Main effects of diagnostic status and emotion subgroup were non-significant, as were their interaction with task state. Identification of temperament groups provide support for measurable patterns of emotional heterogeneity in ADHD, and EEG findings highlight the importance of considering task-based influence on state emotionality alongside trait-based features.
FUNDING: NIH R01 MH120109

POSTER SESSION I - 073 | INFLUENCE OF DEPRESSION AND RESTING PARASYMPATHETIC ACTIVITY ON EVALUATIVE RESPONSES

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Evaluations of emotional information influence a range of behaviors, including decision-making and social interaction, with consequences for socioemotional wellbeing. Both depression and resting parasympathetic nervous system (PNS) activity are related to shifts in evaluative processing, specifically an increased sensitivity to negative information. Though resting PNS activity is associated with elevated risk of depression, little work has examined the interaction of these constructs in shaping evaluations. Nascent evidence suggests that depression may heighten both positive and negative responses, and our own work points to a similar effect of resting PNS (Faig et al., in review). The present study sought to clarify these enhanced ambivalent (positive and negative) tendencies by examining the role of attention and emotion regulation in evaluation of emotional images. Preliminary results suggest that higher depressed mood is associated with greater attentional bias toward images as well as increased positive evaluation of neutral images. Lower self-reported emotion suppression, but not lower resting PNS activity, is also associated with increased positive evaluation of images. This work illustrates the complexity of factors influencing evaluative processes and points to a need for additional research on positivity and ambivalent responses associated with depression and PNS activity.

POSTER SESSION I - 074 | TESTING A DISGUST GENERALIZATION HYPOTHESIS OF MISOPHONIA: A NEUROIMAGING STUDY

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Misophonia (MP) is characterized by aversion to repetitive bodily sounds (e.g., chewing) that prompts avoidance (i.e., not eating with people). Those with MP typically describe triggers as disgusting. Functional neuroimaging studies comparing individuals with MP to controls when listening to "triggers" find increased anterior insula activity, which has been linked to disgust processing. The present study tested a "disgust generalization" hypothesis, whereby, the anterior insula will show greater activity in individuals with MP relative to controls for triggers but similar activity for disgust sounds. Participants included young adults (18-39 yrs) with minimal (N=21) or moderate+ (N=18) levels of misophonia based on the Amsterdam Misophonia Scale. During fMRI, participants listened to misophonic triggers and disgust sounds (e.g., vomit). Analysis pipeline included fMRIPrep, SPM, and mean activation extraction for the anterior insula with MarsBaR. Sound categories were compared with Repeated Measures ANOVAs. Disgust generalization alone was not supported. The anterior insula was more active in individuals with MP compared to controls for both

misophonic triggers and disgust sounds. Within MP, however, misophonic and disgust cues did not significantly differ in anterior insula activation, suggesting increased anterior insula activity for misophonic triggers likely contributes to the disgust experience reported by individuals with MP. Overall, MP exhibited both generalization of the disgust response to triggers, and sensitivity to disgust cues compared with controls.
FUNDING: UF Center for OCD Anxiety and Related Disorders Pilot Grant

POSTER SESSION I - 075 | BOOSTING MOTIVATION: THE EFFECTS OF TRANSCUTANEOUS AURICULAR VAGUS NERVE STIMULATION ON REWARD-BASED BEHAVIOR

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This study investigated the effects of transcutaneous auricular vagus nerve stimulation (taVNS) on reward-based behavior in individuals with (n = 34) and without (n = 34) depressive symptoms. Anhedonia, a core symptom of major depressive disorder, is linked to altered reward processing. Prior research suggests that taVNS may enhance reward motivation, possibly by increasing dopamine activity. Using a within-subject design, participants received either taVNS or sham stimulation on two separate days. During each session, they completed the Effort Expenditure for Rewards Task (EEfRT) and the Probabilistic Reward Task (PRT) to assess reward-based behavior. Stimulation type and task order were randomized. Results showed a marginal increase in heart rate variability following taVNS compared to sham, particularly in participants with depressive symptoms ($F = 3.40$, $\eta^2 = 0.02$). TaVNS significantly increased willingness to exert effort for rewards, especially during trials with low ($F = 3.28$, $\eta^2 = 0.01$) and medium ($F = 2.96$, $\eta^2 = 0.01$) probabilities of reward, with stronger effects in the depressive group. However, taVNS did not affect reward-based learning as measured by the PRT. Self-report measures indicated a significant reduction in anxiety levels after taVNS in both groups ($F = 7.626$, $\eta^2 = 0.05$). Although effect sizes were small and limited to a single stimulation session, these results may help clarify the mechanisms underlying taVNS and its potential benefits in enhancing motivation in individuals with depressive symptoms.

POSTER SESSION I - 076 | LEFT OR RIGHT? FRONTAL AND PARIETAL ALPHA ASYMMETRY IN SOCIAL ANXIETY

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University of Hamburg

Brain lateralization, as indicated by neural alpha asymmetry, is considered a potential marker for approach/withdrawal (Davidson model) and anxious apprehension/arousal (Heller model), making it a promising biomarker in clinical research. However, previous studies on social anxiety disorder (SAD) have yielded mixed results. In this cross-sectional study, we investigated potential trait-like hemispheric alterations of frontal and parietal alpha activity (8-13Hz) among patients with social anxiety disorder (SAD, n = 77) and community controls (CON, n = 105). Participants first underwent a structured clinical interview, followed by the completion of a battery of questionnaires. Finally, their resting-state electroencephalogram (EEG) was recorded. Results indicated more left-than-right frontal alpha activity in the SAD compared to the CON group, while a comorbid depression diagnosis did not influence the findings. Similarly, social anxiety symptom severity, but not depression severity, was dimensionally linked to more left-than-right frontal activity. No alterations were observed in parietal activity. In conclusion, more left-than-right frontal alpha activity, but not parietal alpha activity, appears to be a promising diagnostic marker for social anxiety. However, further investigation is needed to determine the specificity of these results concerning other anxiety disorders, to discern whether alpha asymmetry is more trait- or state-associated, and to assess its utility as a predictor for symptom progression or treatment response.
FUNDING: German Research Foundation (DFG-Grant RI-2853/2-1 awarded to Anja Riesel)

POSTER SESSION I - 077 | ENTITLED TO AN UPDATE: CONTEXT UPDATING IS UNRELATED TO REWARD ANTICIPATION AT HIGH TRAIT ENTITLEMENT

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The cognitive-personality vulnerability (CPV) model suggests that trait psychological entitlement endures when entitled beliefs are defensively enhanced rather than updated after expectation violations. Heightened anticipation accompanied by unrealistic expectations predisposes those high in entitlement to experience such violations. The link between reward anticipation (stimulus preceding negativity [SPN]) and context updating (feedback P3; FbP3) was examined to identify whether the relationship is moderated by entitlement. We hypothesized that heightened anticipation (i.e., larger SPN) would be associated with reduced context-updating (i.e., smaller FbP3), but only at high levels of entitlement. Eighty undergraduates completed the effort-doors task and the Psychological Entitlement Scale. Multilevel modeling was used to test the effects of entitlement and SPN on FbP3, controlling for level of effort (low, high). Simple-slope analyses showed that larger SPN was associated with larger FbP3 at low levels of entitlement. SPN was not related to FbP3 at high levels of entitlement. At low levels of entitlement, heightened anticipation was associated with greater context-updating following reward receipt. The results indicate that regardless of how attentive those high in entitlement are during anticipation, their level of context-updating remains stable. Within the CPV model of entitlement, this finding suggests that entitlement is characterized by a form of context-updating that overlooks expectation-driven attention allocation to feedback.

POSTER SESSION I - 078 | CORRELATING TRAIT DISINHIBITION, EXTERNALIZING, AND STIMULUS-LOCKED EVENT-RELATED POTENTIALS IN THE GO/NO-GO CONTEXT

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Disinhibition, a commonly examined trait, is largely characterized as one's propensity for engaging in externalizing behaviors due to impulse-control problems. This study extends research on the neural correlates of externalizing proneness and focuses on N2 and P3 event-related potential (ERP) amplitudes within a go/no-go task context. Using the go/no-go task, an attempt was made to identify the relationship between the N2 and P3 ERPs with externalizing, and the mediating role (if any) disinhibition plays between them. Data was drawn from a sample of 83 adults. The go/no-go task measured cued responses to target "go" stimuli in the presence of denied dominant prepotent response ("no-go"). Disinhibition was assessed via the ESI-BF, and externalizing via the CAB scale. EEG data, collected using a 128-electrode system, were preprocessed for artifact correction and baseline normalization, with N2 and P3 amplitudes extracted from task-relevant conditions. Linear regressions were used to analyze the relationships between ERP components, externalizing, and disinhibition scores. Results indicate 1) a smaller no-go P3 relates to increased externalizing, with an insignificant no-go N2-externalizing relationship and 2) the no-go P3 and N2 associations with externalizing were accounted for by disinhibition. Findings call into question the true role of ERPs as endophenotypes of externalizing, and demonstrate a continued need to understand how and if certain event related potentials are markers of externalizing, among other traits.

POSTER SESSION I - 079 | ALTERATIONS IN APERIODIC NEURAL ACTIVITY ASSOCIATED WITH MAJOR DEPRESSIVE DISORDER

Sarah Woronko[1], Mohan Li[2], Jason Scott[2], Manuel Kuhn[3], Shiba Esfand[2], Mario Bogdanov[3], Brian Boyle[3], Samantha Linton[3], Lauren Borchers[3], Peter Zhukovsky[3], Courtney Miller[2], Paula Bolton[2], Shuang Li[3], Robert Meisner[4], Ty Lees[3], Diego Pizzagalli[5]
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Historically treated as noise, the aperiodic exponent (i.e., 1/f shape of the power spectrum) and aperiodic offset (i.e., vertical shift of the power spectrum) underlying canonical oscillatory activity may reflect excitatory-inhibitory (E:I) signaling balance and neuronal cell firing, respectively. However, despite known E:I dysregulation in depression, few studies to date have compared individuals with and without major depressive disorder (MDD) in their aperiodic activity, and no study has isolated features of MDD that may drive differences. Here, individuals with (n=58; 38F, aged 35.9±14.4 years) and without (n=34, 25F, aged 32.5±14.1 years) MDD completed 4-minutes of eyes closed resting state electroencephalography. The Fitting-Oscillations-One-Over-F (FOOOF) pipeline was used to extract aperiodic parameters for each electrode. Estimations were condensed to derive aperiodic parameter values at anterior, central, and posterior regions and globally. ANCOVA models controlling for age revealed significant group differences in both the aperiodic exponent and offset for central and posterior regions such that individuals with MDD showed lower aperiodic parameters than controls (Fs ≥4.31, ps≤.041). Follow-up pairwise comparisons showed that this effect was driven by the number of lifetime episodes of depression such that individuals with five or more episodes had lower aperiodic parameters than controls (ts≥2.72, ps<.048). Results suggest the potential importance of decreased aperiodic activity and altered E:I balance as mechanisms of depression and its chronicity.
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POSTER SESSION I - 080 | RACE BIAS IN THE DECISION TO SHOOT: EXAMINING THE ROLES OF STIMULUS EVALUATION AND RESPONSE CONFLICT

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Theories of the regulation of racial bias posit that successful regulation depends on the implementation of top-down prejudice-control motives over the influence of automatic, bottom-up race cues. Recent ERP research has supported the viability of these models by showing that within-person variability in attention to race-related cues predicts variability in bias as a function of individual differences in motivation to respond without prejudice (MCP). We extended this research using a paradigm—the First-person Shooter Task (FPST)—in which racial cues are combined with images conveying either threat or safety and requiring participants to make split-second decisions to either "shoot" or "not shoot" accordingly. This task reliably elicits a bias to shoot unarmed Black targets more readily than unarmed White targets. White undergraduates (N = 99, 65 male) completed the FPST while EEG was recorded and self-report measures of MCP. ERP indices of stimulus evaluation (P3) and response conflict (N450) were derived and disaggregated into their between- and within-person components to examine trial-to-trial implementation of behavioral bias control. On a given trial, larger P3 amplitudes (than one's own average) were associated with bias control for those motivated by egalitarianism (vs. social reasons). Conversely, larger (more negative) N450s were associated with relative increases in behavioral bias, regardless of MCP. Results suggest processes related to bias control are complex and task-dependent but generally support self-regulation theories of prejudice.
FUNDING: NSF BCS 0847872

POSTER SESSION I - 081 | EXAMINING SUBCORTICAL CORRELATES OF PREDICTION ERROR DURING A PROBABILISTIC AVOIDANCE LEARNING TASK USING 7-TELSA FMRI

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Predictive processing theories posit that a brain models its body in the world as continual predictions of incoming sensory signals that arise from motor plans. The difference between incoming sensory signals and the brain's sensory predictions is termed 'prediction error' (PE). Although the cortical correlates of PE have been previously studied, subcortical nuclei have received less attention, in large part due to the relatively poor spatial resolution and low signal-to-noise in 3-Tesla fMRI. Given this, we used ultra-high field 7-Tesla fMRI to estimate subcortical correlates of PE. A sample of (n=35) healthy adults completed a 7-Tesla fMRI session including a probabilistic avoidance learning task, in which they learned to associate affectively aversive or neutral images with preceding probabilistic visual cues (where probability changed in a random walk). Affective images thus varied in their predictability, and the PE of each image was calculated using a Q-learning algorithm. The BOLD response to each image was modulated by PE and showed a significant association with bilateral BOLD signal in primary visual cortices, amygdala, caudate, thalamus, and periaqueductal gray (PAG), among other areas (FDR corrected <0.05). Future analyses will analyze simultaneously collected heart rate data to assess potential covariation between PE and changes in peripheral physiology. These findings highlight subcortical contributions to prediction error encoding, providing a critical step toward a more complete, brain-wide understanding of how the brain models its body in the world.
FUNDING: National Cancer Institute U01 CA193632

POSTER SESSION I - 082 | INVESTIGATING CROSS-MODAL TEMPORAL DYNAMICS AND SEMANTIC INCONGRUENCY IN MULTISENSORY INTEGRATION: AN ERP STUDY

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Multisensory integration happens preattentionally. Using EEG, this study employed a modified Oddball paradigm to elicit three types of Mismatch Negativity (MMN) responses to bimodal stimuli in a single task. The standard stimulus (meowcat) occurred in 70% of trials, while the three deviants (meowfrog, ribbitcat, ribbitfrog) each occurred in 10% of trials.The goal was to examine how sensory modalities and semantic congruency influence multisensory processing by assessing MMN effects in meaningful audiovisual contexts. Data were collected from 22 college students. Mean amplitude analysis revealed strong visual and audiovisual MMNs (100–250 ms). A two-way RMANOVA revealed a significant visual Colavita effect, indicating visual dominance, which was further evidenced by delayed fractional latency for auditory difference waves (N2-like ERP) relative to visual and audiovisual difference waves. Offset peak latency analysis indicated an interplay between visual and auditory modalities, with higher processing costs for semantically incongruent stimuli. To explore semantic modulation, difference waves (300–500 ms) were analyzed and revealed N400 effects for auditory and audiovisual semantic violations. These findings suggest a biphasic processing pattern for audiovisual deviants: an early detection stage followed by later semantic analysis. The distinct processing windows for visual and auditory deviants highlight the visual modality's efficiency in multisensory integration. This study underscores the brain's adaptability and the impact of semantic context on sensory processing.
FUNDING: Hill Grant

POSTER SESSION I - 085 | PARAMETER-SPECIFIC EFFECTS OF TAVNS ON PHYSIOLOGICAL AND NEURAL MARKERS

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Transcutaneous auricular vagus nerve stimulation (taVNS) has received growing interest for its potential to influence brain-body interactions, with implications for both clinical and experimental research. However, the field lacks consensus on the most effective stimulation settings that elicit reliable physiological effects. This study aimed to assess how varying the stimulation frequency and pulse width modulate physiological and neural responses to taVNS. Forty-eight volunteers participated in a within-subjects study that involved active taVNS at the cymba conchae and sham stimulation at the earlobe, administered in two lab sessions scheduled one week apart. Each participant experienced nine stimulation protocols that differed in frequency (10Hz, 25Hz, 50Hz) and pulse width (100µs, 200µs, 300µs), while electrocardiography, electrodermal activity, and electroencephalography were recorded continuously. Stimulation decreased heart rate and increased skin conductance. Preliminary analyses indicate modulation of heartbeat-evoked potentials, suggesting that taVNS may influence cortical processing of interoceptive signals. Pulse width had the strongest impact on both autonomic reactivity and self-reported experience, with wider pulses perceived as more intense and painful. These findings emphasize the importance of pulse width in modulating autonomic effects and perceptual experience in response to taVNS. Further research should further investigate neural markers to deepen our understanding of taVNS mechanisms and optimize strategies for its therapeutic use.

POSTER SESSION I - 086 | ERPS TO FACIAL EXPRESSIONS ARE RELATED TO PERCEIVED VALENCE AND AROUSAL: A REPLICATION AND EXTENSION

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University of Waterloo

Deciphering others' emotional states through their facial expressions is a critical visual process which can be studied using ERPs. One recent study directly demonstrated that perceived face valence (positive/negative) and arousal (calm/agitated) drive some of the ERP facial expression effects (Durston & Itier, 2025; Psychophysiology). In that study, 80 participants viewed neutral, happy, angry and fearful faces while discriminating gender, and rated each face on valence and arousal after the study. For each participant, ratings of each unique face were linked back to corresponding ERP trials. In the present study, the same faces were used but participants performed affective ratings after each trial, as opposed to after the study, thus capturing the true "in the moment" perceived valence and arousal. Preliminary full-scalp mass-univariate analyses (N=42; Goal N =80) revealed a near-identical trend to the previous study, with affective ratings modulating the ERP differences between emotional expressions on N170 for threat-related contrasts (e.g., fear vs neutral) and on the EPN for happy expression contrasts (e.g., happy vs neutral). These findings suggest threat-related affective information is encoded during the N170 regardless of the task or face repetition.
FUNDING: Natural Science Research and Engineering Research Councill of Canada (NSERC)

POSTER SESSION I - 088 | MALES, ACES, AND INFANT FACES, OH MY: A P300 EVENT-RELATED POTENTIAL STUDY

Tiffany Bonnagio, Mary Jo Hedrick, Eric W. Sellers
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Research examining adverse childhood experiences (ACEs) and the P300 event-related potential has been inconclusive. Studies have shown that people with more ACEs have an increase in P300 amplitude, a reduction in P300 amplitude, or that there is no relationship between ACEs and P300 amplitude. In this study, we examined self-reported childhood adversity and P300 amplitude in college age female and male students. Prior to the study, participants completed the Variability in Adverse Childhood Experiences (VACE) scale, which measures adversity the participant experienced in childhood, as well as the magnitude of adversity. Participants were tasked with differentiating between negative, positive, and neutral infant facial affect in a canonical oddball task. The P300 analyses did not reach statistical significance, and the VACE scores did not differ for females and males; however, there was a significant positive correlation between VACE scores and P300 target amplitude for male participants in every emotional affect category. The results of this study suggest that the relationship between ACEs and P300 amplitude is complex and likely influenced by biological differences and social expectations of the sexes.

POSTER SESSION I - 089 | THE ANTERIOR LATE POSITIVE POTENTIAL ELICITED DURING SELF-REFERENTIAL PROCESSING SHOWS STABILITY OVER TIME IN GIRLS BUT NOT BOYS

Jun Chu, Jaron Xe Yung Tan, Pan Liu
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Self-referential processing is a critical aspect of social development closely implicated in the development of internalizing problems (anxiety and depression). The Self-Referent Encoding Task (SRET), combined with the ERPs, has been widely used to tap the neural substrates of self-referential processing in children. However, limited research has examined the stability of the SRET-elicited ERPs in children; it is unclear whether girls, who are at higher internalizing risks, differ from boys in their stability of the neural substrates of the SRET. A total of 115 typically developing children (66 girls) completed an EEG version of the SRET twice with one year apart (Mean age/SD: T1=11.00/1.16; T2=12.06/1.20 years). To examine the test-retest reliability of the SRET-elicited ERPs, we computed Pearson's correlations between T1 and T2 ERPs in the full sample and in each sex group. The anterior late positive potential (aLPP) showed significant test-retest correlations in the full sample for both the positive and negative SRET conditions (ps<.01). Interestingly, the correlations of the aLPP in both conditions were significant in girls (ps<.01) but not in boys (ps>.06). Fisher's Z test further showed that girls' correlation coefficient was significantly larger than boys' in the positive (z=2.14, p=.03), but not negative (z=0.60, p=.55), condition. As the SRET-elicited aLPP has been linked with internalizing symptoms in children, we speculate that the higher stability of the aLPP may serve as a potential mechanism underlying girls' heightened internalizing risks compared to boys.
FUNDING: This work is supported by a National Institute of General Medical Sciences Centers of Biomedical Research Excellence (P20 GM103505) pilot grant to Pan Liu.

POSTER SESSION I - 090 | INFLUENCE OF SEX, PAIN CATASTROPHIZING AND GENDER ROLES ON PAIN INHIBITION MECHANISMS

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Pain is a multidimensional experience influenced by biopsychosocial factors. Previous studies indicate that pain perception and pain inhibition may be affected sex, gender roles and pain catastrophizing. However, the mechanisms of such effects remain unclear. The aim of the present study was to investigate the brain mechanisms underlying the influence of these factors on pain inhibition. Thirty-eight young healthy volunteers were recruited in the study. Pain inhibition was assessed with a noxious counter-stimulation paradigm, with three series of 20 painful phasic electrical stimuli applied to the right ankle before, during, and after a tonic noxious cold stimulus was applied to the left forearm. Event-related brain potentials were measured with electroencephalography. The noxious cold stimulus reduced shock pain ($p < .001$) and shock-evoked brain activity:

N100 ($p < .001$) and P260 ($p < .001$). No difference was observed in the amplitude of these effects between males and females. However, the inhibitory effects were not statistically significant when accounting for masculinity, for pain ($p = .7$) and the P260 ($p = .5$), and when accounting for pain catastrophizing, for the N100 ($p = .1$) and the P260 ($p = .5$). These results suggest that pain inhibition is modulated by psychosocial factors through the regulation of early and late pain-related brain processes, which deserves to be considered in futures studies on pain inhibition.
FUNDING: FRQNT, UQTR, QPRN and NSERC

POSTER SESSION I - 092 | SLEEPINESS BUT NEITHER FLUID NOR CRYSTALLIZED INTELLIGENCE CAN BE PREDICTED FROM RESTING STATE EEG – EVIDENCE FROM THE LARGE SCALE COSCIENCE EEG-PERSONALITY PROJECT

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Previous electroencephalogram (EEG) studies linked measures of spectral power under rest and fluid intelligence; however, subsequent high-powered studies challenged this relationship. The present study aimed to address previous limitations (low statistical power, lack of preregistration) and investigate the predictability of intelligence measures from resting-state EEG in the CoScience data set ($N = 772$). Support vector regressions were applied to analyze eight minutes of resting-state EEG with eyes open and closed before and after unrelated tasks. The decoding performance between the spectral power of 59 EEG channels within 30 frequency bins and fluid and crystallized intelligence, was evaluated with a 10-fold cross-validation. We could not identify any meaningful associations between resting-state EEG spectral power and either fluid or crystallized intelligence. However, we replicated the previously reported association between state sleepiness and theta power, attesting to the integrity of the CoScience data set. Furthermore, the decomposition of the EEG signal into its periodic and aperiodic components revealed that the aperiodic offset parameter is significantly correlated with state sleepiness, emphasizing the relevance of aperiodic signal components in understanding states of alertness versus sleepiness.
FUNDING: German Research Foundation

POSTER SESSION I - 093 | AUDIOTACTILE INTEGRATION IN A DROWSY STATE

Clara Alameda Jiménez[1], Chiara Avancini[1], Marina Dauphin[1], Louis Roberts[2], Tristan Bekinschtein[2], Andrés Canales-Johnson[2], Daniel Sanabria[1], Luis F. Ciria[1]
[1]University of Granada, [2]University of Cambridge

Fluctuations in alertness occur constantly across the day but are exacerbated during transition towards sleep, where drastic physiological changes have an impact in the way we process internal and external stimuli. In this study, we investigated audio-tactile integration during drowsiness, specifically the 'redundancy effect', characterized by faster responses to multisensory stimuli than to unisensory stimuli. While this phenomenon is well-characterized in fully alert individuals, little is known about what happens under reduced alertness. To address this question, 26 easy-sleepers seated in a comfortable reclining chair with the lights off and were facilitated to fall asleep while performing a detection task involving (a) tactile, (b) auditory, or (c) combined audio-tactile stimuli. Their brain activity was monitored using electroencephalography (EEG), which enabled us to classify their cognitive state as either "awake" or "drowsy" based on pre-trial EEG time-frequency. We combined behavioral data with computational modeling, event-related potentials (ERPs), multivariate pattern analysis (MVPA) and multivariate co-information (MV-CoI) to characterize the spatiotemporal and informational dynamics of multisensory processing during awake and drowsy states. While attenuated, the classical redundancy effect was still evident during drowsiness. However, this preservation occurred alongside a decline in overall performance and some alterations in both neural dynamics and information flow relative to wakefulness.
FUNDING: PID2022-142737NA-I00; FPU21/33088

POSTER SESSION I - 094 | THE IMPACT OF BILINGUAL LANGUAGE EXPERIENCE ON VERBAL AND VISUOSPATIAL WORKING MEMORY

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University of Ottawa

The bilingual advantage hypothesis posits that bilinguals perform better than monolinguals on executive function tasks. However, most studies compare bilinguals to monolinguals, ignoring individual differences in language experience. Moreover, there are few studies that compare verbal and non-verbal/visuospatial tasks. In this study, we use electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) to examine the influence of different bilingual language experience factors on verbal and visuospatial working memory (WM). Young adult French-English bilinguals performed two versions of an n-back task that differed only in terms of stimuli (i.e. verbal or visuospatial) during EEG recording and in the fMRI scanner. In addition, detailed self-report and objective measures of language experience were collected. Preliminary analyses of the electrophysiological results show that verbal and visuospatial WM are influenced by different language experience factors. Specifically, age of second language acquisition and language switching measures were associated with verbal WM, whereas language proficiency was associated with visuospatial WM. fMRI results suggest that different brain regions are recruited during the performance of verbal and visuospatial WM tasks; subsequent analyses will relate these differences to language experience factors. In general, greater bilingual experience was associated with indicators of better WM; results will be discussed in in terms of the influence of bilingual language experience, measured along a continuum, on executive function.
FUNDING: Natural Sciences and Engineering Research Council Alzheimer's Society of Canada

POSTER SESSION I - 095 | MEMORY UNDER STRESS: THE ROLE OF AUTONOMIC NERVOUS SYSTEM REACTIVITY IN RECOGNITION AND RECALL

Katherine Archer, Kimele Persaud, Karen Smith
Rutgers University

Prior research suggests that stress at encoding can enhance learning and memory. However, the mechanisms through which stress modulates memory in humans are unclear and the role of autonomic nervous system (ANS) reactivity has been underexplored. Here, we examine whether ANS reactivity to stress moderates recognition and recall memory. We explore whether differences in reactivity in the parasympathetic (PNS) and sympathetic nervous systems (SNS) affect memory performance under stress. Sixty-four undergraduate students studied trivia questions immediately following a stressor (cold pressor) or control condition. Twenty-four hours later, participants returned to the lab and were tested on their recognition (n=32) or recall (n=32) for answers to the trivia questions. Indices of ANS activity were collected throughout. While there was no main effect of stress on recognition or recall, SNS reactivity moderated recognition performance, such that increased SNS reactivity was associated with greater recognition accuracy ($r(15) = .59$, $p < .05$). Initial results suggest sympathetic engagement may drive the enhancing effects of stress on memory, and these effects appear to differ depending on memory mechanisms. Sympathetic engagement during encoding may facilitate our ability to discriminate previously seen information from new information as required for recognition, but may not enhance memory search as required for recall. Further research examining stress reactivity across systems and task contexts can elucidate how stress impacts memory.

POSTER SESSION I - 096 | BEYOND THE LIMIT: NEURAL DYNAMICS FROM REST TO EXTREME PHYSICAL EXERTION

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High-activation states induced by aerobic exercise involve complex physiological transitions, which have traditionally been studied in terms of cardiorespiratory changes. We propose that state transitions under high-physiological activation can also be captured by alterations in neural dynamics. In this study we aim to characterize neural transitions by quantifying both linear and nonlinear adaptations in neural activity as exercise intensity increases from rest to maximal exertion. Participants (n = 28) cycled on a stationary bike, starting at light intensity and escalating by 30 watts every five minutes. Participants were instructed to maintain a constant pedaling cadence until they could no longer continue, reaching volitional exhaustion. Resting-state periods were also included before and after exercise. Electroencephalographic (EEG) activity, cardiorespiratory parameters, and power output were continuously recorded. We characterized state transitions by quantifying the oscillatory and aperiodic spectral parameters of the EEG, as well as neural complexity and functional connectivity through information theory and entropy measures. Through mixed models, we show that neural measures not only associate with physiological changes but also reflect the process of reaching maximal exertion beyond what is explained by cardiorespiratory indices. Our results suggest that high-activation states are defined not only by physiological transitions but also by changes in neural dynamics, opening new avenues for investigating complex transitions under physiological stress.
FUNDING: Spanish Ministry of Science, Innovation and Universities PID2023-152220NA-I00 University of Granada Plan Propio UGR2022

POSTER SESSION I - 097 | TESTING THE EFFECTS OF INTERMITTENT PNEUMATIC COMPRESSION BOOTS ON HEART RATE VARIABILITY

Thomas Baldwin, Bethany Hartwell, Sophia Cranney, John Livingstone, Calleb Doutt, Grace Walker, Anna Wheeler, Eliza Young, Patrick Steffen, T.J. Bass, Brett Mortensen, Michael Larson
Brigham Young University

Intermittent Pneumatic Compression (IPC) inflates and deflates air chambers to mimic muscle contractions, enhancing venous return and lymphatic drainage. IPC affects blood pressure (BP), aids relaxation, and supports recovery in athletic and surgical contexts. We hypothesized IPC improves autonomic nervous system (ANS) function, particularly parasympathetic nervous system (PNS) activity, assessed through heart rate variability (HRV) and BP. Elevated resting HRV correlates with reduced risk for anxiety, dementia, and depression, and is an index of systemic stress. IPC may non-invasively improve mood, cognition, and recovery as measured by HRV. We tested 81 healthy undergraduates (Mage=21.6, SDage=2.4, F=44), assessing HRV (log-transformed LF, HF, SDNN, RMSSD) and systolic BP at baseline (PRE), during IPC (MID), post-IPC (POST1), and recovery (POST2). Mood, stress, fatigue, and leg soreness were measured with Visual Analogue Scales (VAS). Repeated-measures ANOVA revealed significant time effects for mean heart rate (HR), LF, and SDNN. Mean HR decreased from PRE to MID and stayed low ($F=40.2$, $p<0.001$); LF decreased at MID then increased during POST1 and POST2 ($F=12.4$, $p<0.001$); SDNN reduced during MID, normalizing by POST1 and POST2 ($F=6.9$, $p<0.001$). VAS showed significant reductions in soreness and stress from PRE to MID and remained decreased ($F=14.5$, $p<0.001$; $F=38.4$, $p<0.001$). BP, HF, RMSSD, mood, and fatigue showed no significant time effects. Overall, IPC showed clear psychological benefits, though conflicting effects on ANS measures require further testing.

POSTER SESSION I - 098 | FEAR-INDUCED BRADYCARDIA: TRANSIENT PARASYMPATHETIC DYNAMICS REFLECT RESPONSES TO CONDITIONED FEAR

Simone Battaglia[1], Stefano Orsolini[1], Sara Borgomaneri[1], Riccardo Barbieri[2], Stefano Diciotti[1], Giuseppe di Pellegrino[1]
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Understanding transient dynamics of the autonomic nervous system during fear learning remains a critical step to translate basic research into treatment of fear-related disorders. In humans, it has been demonstrated that fear learning typically elicits transient heart rate deceleration. However, classical analyses of heart rate variability (HRV) fail to disentangle the contribution of parasympathetic and sympathetic systems, and crucially, they are not able to capture phasic changes during fear learning. Here, to gain deeper insight into the physiological underpinnings of fear learning, a novel frequency-domain analysis of heart rate was performed using a short-time Fourier transform, and instantaneous spectral estimates extracted from a point-process modeling algorithm. We tested whether spectral transient components of HRV, used as a noninvasive probe of sympathetic and parasympathetic mechanisms, can dissociate between fear conditioned and neutral stimuli. We found that learned fear elicited a transient heart rate deceleration in anticipation of noxious stimuli. Crucially, results revealed a significant increase in spectral power in the high frequency band when facing the conditioned stimulus, indicating increased parasympathetic (vagal) activity, which distinguished conditioned and neutral stimuli during fear learning. Our findings provide a proximal measure of the involvement of cardiac vagal dynamics into the psychophysiology of fear learning and extinction, thus offering new insights for the characterization of fear in mental health and illness.

POSTER SESSION I - 099 | AUTONOMIC NERVOUS SYSTEM MODULATION OF WORKING MEMORY UNDER ACUTE STRESS

Ming-Hsin Cheng, Chen-En Lin, Yi-Ching Wan, Yong-Han Sun, Zhao-Hong Wei, Shiau-Hua Liu
National Dong Hwa University

This study examined how acute stress influences working memory (WM) performance with concurrent heart rate variability (HRV) and galvanic skin response (GSR) monitoring. Forty-eight undergraduate students were randomly assigned to a stress group performing the Montreal Imaging Stress Task (MIST) or a control group completing a non-stressful arithmetic task. Participants completed WM tasks before and after the manipulation, with physiological data collection beginning at the pre-Corsi Block Tapping (CBT) task, serving as an approximate baseline. Results revealed that acute stress did not significantly impair WM accuracy. However, the stress group showed significantly faster reaction times on the N-back task ($t(46) = 2.264$, $p = .028$), suggesting enhanced processing speed under stress (M stress = 0.827 s; M control = 0.958 s). Although the stress group's CBT span was descriptively higher than the control group's post-test span, this difference was not significant ($F(1,46) = 0.521$, $p = .474$). GSR data confirmed effective stress induction. Physiological measures (HRV, GSR) did not correlate with CBT performance or predict WM accuracy. A significant interaction between sex and CBT span on GSR ($F(1,22) = 4.559$, $p = .044$) suggested sex-related differences in physiological reactivity to acute stress. Our findings align with previous work showing that stress does not consistently impair WM and may even enhance it (Duncko et al., 2009; Giles et al., 2014), with sex emerging as a potential moderator (Shields et al., 2016; Schoofs et al., 2013; Hokenson et al., 2022).

POSTER SESSION I - 100 | DAILY WORRY AND PHYSIOLOGICAL REACTIVITY TO PSYCHOSOCIAL STRESS: AN EXPERIMENTAL AND ECOLOGICAL ASSESSMENT ON STRESS ANTICIPATION

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Università degli Studi di Padova

Adjusting to minor psychosocial stressors, such as public speaking, is crucial for health and well-being. However, not everyone manages this effectively, which can lead to chronic stress, illness, and affective disorders. According to the perseverative cognition hypothesis, repetitive negative thinking (e.g., worry, rumination) prolongs stress-related affective and physiological activation, especially before and after a stressor, whereas during the stressor it may be protective. We tested this hypothesis using an experimental study combining real-life experience sampling and a lab-based public speech task. Participants completed three lab sessions at T1 (day 1), T2 (day 2), and T3 (day 3), each including resting ECG recordings. At T1, they were informed they would face a moderate psychosocial stressor at T2. At T2, they underwent the Trier Social Stress Test. At each session, affective state was assessed using the State-Trait Anxiety Inventory. Daily worry was measured via a smartphone app, distinguishing between stressor-related and nonspecific worries. Preliminary analyses ($N = 15$) supported the hypothesized psychophysiological pattern: higher stressor-related worry predicted elevated heart rate (HR) at T1 and T3, but not during the stressor at T2. Conversely, higher nonspecific worry was associated with lower HR across sessions. Both worry types were linked to increased subjective anxiety prior to the stressor.

POSTER SESSION I - 101 | DYNAMIC HEART RATE VARIABILITY RESPONSES ANGER RECOVERY ROLE SOCIAL INHIBITION

Stefanie Duijndam, Nina Kupper
Tillburg University

Laboratory research on individual differences in response to stress largely relies on the changes in the average values of physiological parameters from baseline to stress to recovery. However, less is known about the dynamic changes that occur during exposure to the stressor, as habituation or other factors may affect the response systems. This study therefore investigated whether 30 second epoch average changes in root mean square

of successive differences (RMSSD) during an Anger Recall task and recovery are associated with the personality trait social inhibition. 144 undergraduate students (Mage = 20.3; 79.9% female) completed the SIQ15 and participated in the Anger Recall task, while an electrocardiogram was continuously recorded. Average RMSSD was calculated for 30 seconds epochs within each experimental phase (i.e., 4 minutes of Anger Recall, 2 minutes of recovery). Analyses were performed using linear mixed modelling, with separate models for changes in RMSSD during speech and recovery, while controlling for average baseline RMSSD and sex. Results showed a main effect of time ($F = 45.96$, $p < .001$) and baseline RMSSD ($F = 116.71$, $p < .001$) on RMSSD during speech in the fully adjusted model. RMSSD during anger induction slightly increased over time, suggesting habituation to the stressful situation. With respect to changes in recovery, only baseline RMSSD was significantly associated with RMSSD levels during recovery ($F = 269.72$, $p < .001$). Social inhibition was not related to changes in RMSSD over time during anger induction, nor during recovery.

POSTER SESSION I - 102 | CORTISOL CLOUDS THE GUT FEELING IN DECISION-MAKING UNDER STRESS

Félix Duplessis-Marcotte, Marie-France Mari
Université du Québec à Montréal

The somatic marker hypothesis suggests that emotional physiological signals triggered by the consequence of a given choice (e.g. skin conductance response; SCR) become beneficial to future decisions. In contrast, the stress hormone cortisol has been shown to undermine decision-making under stress (i.e. increases risk-taking). Considering that cortisol modulates brain activity in regions involved in somatic marker production and decision-making, this study aims to test the hypothesis that cortisol will abolish the beneficial effect of somatic markers on decision-making. A total of 109 young adults (54 women) were assigned a psychosocial stressor or a non-stressful control condition before completing the Iowa Gambling Task. In this task, participants had to maximize profits by drawing 100 cards from 4 decks with different gain/loss contingencies: large instant gains, but disadvantageous net gain (risky decks), or small instant gains, but advantageous net gain (safe decks). Somatic markers were measured by SCR before each pick, and saliva samples were collected to quantify cortisol reactivity. Multilevel logistic models revealed that in the stressor-exposed group, high cortisol reactivity abolished the effect of somatic markers on decision-making. Stressor-exposed participants with low cortisol reactivity were still able to use somatic markers to guide their decisions. This study suggests that a strong hormonal stress response can cloud the gut feeling, depriving the stressed individual of the information transmitted by their body as an internal compass for decision-making.
FUNDING: Canada Research Chair in Hormonal Modulation of Cognitive and Emotional Functions; Centre de recherche de l'Institut universitaire en santé mentale de Montréal; Natural Sciences and Engineering Research Council of Canada

POSTER SESSION I - 103 | BRINGING FEAR OF THE DARK INTO THE LIGHT THROUGH A MULTI-MEASUREMENT APPROACH

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Fear of the dark, while widely recognized as a developmental concern for children, is also important in adult clinical populations due to its associations with disrupted sleep, PTSD, and related psychopathology. Despite this, robust assessment of fear of the dark as a construct has received limited attention in modern clinical science. We applied a multi-modal approach to link psychophysiological and self-reported responses to darkness using a custom trait fear of the dark questionnaire. We recorded auditory eyeblink startle via electromyography and self-reported state anxiety in a Dark-Enhanced Startle (DES) paradigm from 64 participants. Self-reported trait fear of the dark was significantly correlated with both DES and self-reported state anxiety in darkness, suggesting convergent and construct validity for fear of the dark. These results increase understanding of this fear, relevant to both childhood development and clinical contexts, and using multiple measures helps to expand the nomological network surrounding fear-related psychopathology. Furthermore, these findings underscore the utility of including self-reported fear of the dark as a continuous covariate to increase power and interpretability in studies assessing DES to analyze effects of focal variables (e.g., psychopathology group status, the effects of new pharmaceuticals and commonly used drugs).

POSTER SESSION I - 104 | NEURAL REACTIVITY TO ALCOHOL CUES IS MODULATED BY ALCOHOL FAMILY HISTORY

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Although prior research demonstrates that individuals with a family history of problematic alcohol involvement (PAI) are at an elevated risk for alcohol-related difficulties, the neurocognitive mechanisms underlying this vulnerability remain insufficiently characterized. This study examined whether P3 amplitude, an event-related potential (ERP) often associated with attentional allocation within the decision-making process, differs among individuals with versus without a parental history of PAI (FH+/FH-) in response to various affective stimuli. Participants (N = 101) reported on parental history of PAI and completed a novelty-oddball task featuring neutral, pleasant, and alcohol related images. Amplitude of the P300 component was evoked by pleasant and neutral IAPS pictures, as well as pictures of alcoholic beverages. FH+ individuals had significantly larger P3 amplitudes to alcohol-related images than FH- individuals ($t(78) = -2.94$, $p = .004$, $d = .76$). This effect was not observed in response to pleasant images, suggesting a specificity to alcohol-related stimuli ($t(78) = -1.23$, $p = .22$). Notably, when controlling for sociodemographics (age, gender) and current past-month drinking levels, FH+ status emerged as the only

significant predictor of P3 amplitude in response to alcohol cues (b = 4.65, p = .004). These findings suggest that individuals with a parental history of PAI exhibit heightened neural reactivity to alcohol related cues, independent of their own current levels of alcohol use and sociodemographics, highlighting a potential mechanism of inherited risk.

POSTER SESSION I - 105 | WHEN FEELING IN CONTROL ISN'T ENOUGH: DISSOCIATING OUTCOME PROCESSING AND LEARNING UNDER VARYING MOTOR FLUENCY

Maren Giersiepen[1], Elif Gezen[1], Simone Schütz-Bosbach[1], Jakob Kaiser[2]
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Research suggests that experiencing agency supports learning from action outcomes and effective behavior regulation. A key determinant of agency experience is how fluently we can act to achieve goals. Yet, it remains unclear how motor fluency influences outcome processing during learning. To address this, we recorded EEG while 35 participants completed a reinforcement learning task involving motor control. On each trial, they chose between two targets and navigated a cursor into the selected one using a touchpad. Motor control was manipulated by systematically altering how the cursor responded to input across blocks, creating high and low control conditions that required adaptation to different action-effect mappings. Gain or loss feedback was presented upon reaching the target, and participants could maximize their bonus by learning which target was more rewarding. Learning was better and target selections were slower in low- compared to high control blocks. EEG analyses revealed higher feedback-locked P300 amplitudes and enhanced feedback-induced theta power in high control blocks, suggesting increased attentional engagement and cognitive control under fluent action. Crucially, a Reward Positivity was observed independent of control condition, indicating an evaluation of outcome value in both contexts. Together, these findings suggest that fluent action execution amplifies the brain's response to outcomes, while the neural representation of value remains unaffected. This may reflect a speed-accuracy trade-off, with faster but less accurate responses under fluent action.
FUNDING: German Research Foundation

POSTER SESSION I - 106 | SELF- AND CO-REGULATION OF PHYSIOLOGICAL ACTIVITY IN MOTHER-CHILD INTERACTIONS: THE ROLE OF BROODING RUMINATION

Brianna Lind, Brandon Gibb
Binghamton University

There is growing evidence for the link between brooding rumination and levels of heart rate variability (HRV) in adults. However, less is known about this relation in children or how brooding may influence self- and co-regulation of physiological activity during parent-child interactions. To address these questions, we examined dynamic changes in HRV in 214 mother-child dyads (M age=9.49, 46% girls, 68% non-Hispanic White) during positive (Vacation Planning) and negative (Conflict Discussion) parent-child interactions. Using Actor-Partner Interdependence Modeling (APIM), we assessed how brooding in mothers or children may moderate actor (self-regulation) and partner (co-regulation) effects on HRV. Children and mothers showed significant self-regulation during both interactions. These actor effects were moderated by levels of brooding during the negative but not positive interaction such that higher levels of brooding in mothers or children were associated with weaker HRV self-regulation in children, while higher levels of child brooding were associated with weaker self-regulation in mothers. Moderation of partner effects emerged in the positive discussion. Specifically, higher levels of mothers' brooding weakened child reactivity to changes in mothers' HRV. In contrast, higher levels of brooding in mothers or children increased mothers' reactivity to changes in child HRV. The findings show how individual differences in brooding can impact self- and co-regulation of physiology during mother-child interactions.
FUNDING: This project was supported by the National Institute of Mental Health grants MH098060 and MH130397 awarded to Dr. Brandon Gibb.

POSTER SESSION II - 001 | MOBILE EEG AS AN EARLY DETECTION TOOL FOR MILD COGNITIVE IMPAIRMENT: EVIDENCE FROM P300 AND MOCA PERFORMANCE

Jennifer Meszaros[1], Isaac Barss[1], Alexandre Henri-Bhargava[2], Olave Krigolson[1]
[1]University of Victoria, [2]Vancouver Island Health Authority

Early detection of Mild Cognitive Impairment (MCI) is crucial, as timely intervention may slow progression. Electroencephalography (EEG), including event-related potentials like the P300, has shown promise in identifying cognitive changes associated with MCI. However, traditional EEG systems are resource-intensive and inaccessible for large-scale screening. This study evaluates the potential of mobile EEG as a cost-effective tool for early MCI detection. 189 participants (ages 64–86) completed a visual oddball task while EEG was recorded using a portable system and underwent cognitive testing with the Montreal Cognitive Assessment (MoCA). Participants were categorized as cognitively normal (n = 111) or MCI (n = 78) based on MoCA scores (<26 indicating MCI). Welch's t-test revealed greater P300 amplitudes in the normal group compared to the MCI group (p = 0.034), supporting the utility of this neural biomarker in early screening. Additionally, linear regression showed that P300 amplitude predicted MoCA score (R = 0.163, p = 0.025), suggesting that neural responses captured via mobile EEG reflect underlying cognitive performance. These results support the feasibility of mobile EEG for identifying early cognitive decline, with implications for widespread, low-cost screening in clinical and community settings. Mobile EEG offers a low-cost approach to early intervention efforts that could reduce the long-term burden of dementia.
FUNDING: Centre for Aging and Brain Health Innovation

POSTER SESSION II - 002 | INVESTIGATING AGE-RELATED COGNITIVE DECLINE IN HEALTHY ADULTS USING CRUNCH AND PERIPHERAL VASCULAR MEASURES

Ben Secord-Bacon, Parker Mills, Seray Altay, Mark Rakobowchuk, Claudia Gonzalez
Thompson Rivers University

Aging is associated with vascular and cognitive decline, but the interplay between these systems remains underexplored. This study investigated whether peripheral vascular health contributes to differences in cognitive performance and brain activation in younger and older adults. We assessed endothelial function using flow-mediated dilation, microvascular responsiveness via muscle near-infrared spectroscopy, and prefrontal cortex activation using functional near-infrared spectroscopy. Thirty-one healthy participants (20 younger, 11 older) completed a working memory task under low to high cognitive load. Older adults had lower flow-mediated dilation responses, indicating impaired endothelial function. Muscle near-infrared spectroscopy data showed steeper muscle reperfusion slopes in older adults, possibly reflecting alternative vascular responses or metabolic differences with aging. Cognitively, older adults showed slower reaction times and reduced accuracy across all loads, with the greatest deficits at higher loads. Older adults had increased prefrontal activation with task difficulty, consistent with the Compensation-Related Utilization of Neural Circuits Hypothesis. However, this overactivation was associated with poorer performance, suggesting reduced neural efficiency and a lack of compensation. Older adults with better flow-mediated dilation responses showed less brain activation and increased accuracy, indicating more efficient functioning. Younger adults maintained faster responses and greater accuracy with a gradual increase in activation across all levels.

POSTER SESSION II - 004 | THE TIME COURSE OF NEGATIVE EMOTIONAL RESPONSES AND ASSOCIATIONS WITH TIME SPENT ON WORK

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Prior research shows that work (both paid and unpaid) may be a source of social, physical, and cognitive engagement in aging adults. Less is known about the mechanisms enabling work participation. This study investigates a potential pathway through negative emotional recovery processes. We tested whether poorer recovery from negative upsets was associated with differences in time spent overall on work, volunteering, and chores. Using data from the Midlife in the United States Study (MIDUS: midus.wisc.edu), linear mixed effects models tested whether faster emotional recovery—measured via facial electromyography from the corrugator supercilii in response to negative images in the lab (n=160) and stress reactivity from self-reported negative affect on days with stress compared to days without stress in daily life (n=829)—predict greater time spent on work. Analyses adjusted for chronic conditions, race, sex, education, income, and retirement. Faster corrugator recovery was associated with greater time spent working at baseline, though this relationship became marginally significant when age was included as a covariate. Stress reactivity was not associated with work at baseline but was associated with work a decade later and greater decline in time working across 10 years. Our findings suggest faster recovery from negative stimuli is associated with more current time working, while less lingering negative affect from stress is associated with more future time. As lifespan increases, results support the importance of emotional recovery in extending years of healthy, active life.
FUNDING: We are extremely grateful to the Midlife in the U.S. (MIDUS) participants and staff for their contributions to the study without which this research would not be possible. Publicly available data from the MIDUS study was used for this research. Since 1995

POSTER SESSION II - 005 | CEREBELLAR WHITE MATTER MICROSTRUCTURE IS ASSOCIATED WITH AGE, AMYLOID LEVELS, AND COGNITION

Elizabeth Paitel, Corinne Pettigrew, Daniel Callow, Abhay Moghekar, Michael Miller, Andreia Faria, Kenichi Oishi, Marilyn Albert, Anja Soldan
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Structural changes in the cerebellum contribute to cognitive impairment due to Alzheimer's disease (AD). However, it is unclear whether aging and AD pathology are associated with structural alterations in the cerebellum among cognitively unimpaired individuals and how these alterations relate to cognition. The current study examined the association of age and cerebrospinal fluid (CSF) AD biomarkers (amyloid beta (Aβ42/40), p-tau181) with cerebellar gray matter (GM) and white matter (WM) volumes and cerebellar WM microstructure, measured via magnetic resonance imaging (MRI). Cognition was measured with executive function and visuospatial composite scores. Older age was associated with lower cerebellar GM and WM volumes (ps<.01) and greater mean diffusion (MD; p<.01). In contrast, more abnormal Aβ levels were associated with lower MD in the middle cerebellar peduncle (p<.01), and a composite of superior, middle, and inferior peduncles (p<.05). Further, lower MD in the peduncles was associated with better executive function and visuospatial composite scores (ps<.05), whereas volumetric MRI measures were not related to cognition. Results suggest that older age is associated with microstructural and volumetric cerebellar GM and WM alterations, while Aβ levels are associated with WM microstructure. These results indicate that Aβ42/40 levels are associated with microstructure alterations in the cerebellar peduncles in cognitively unimpaired individuals, consistent with previous reports in cerebral white matter tracts, which may be sensitive markers of preclinical AD.
FUNDING: U19-AG033655, T32-AG027668, U19-AG065169

POSTER SESSION II - 006 | RESTING-STATE APERIODIC EXPONENT IN THE ANTERIOR CINGULATE CORTEX VARIES WITH ALEXITHYMIA

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Marquette University

Alexithymia is a trait associated with emotion processing deficits such as difficulty identifying feelings (DIF). It is associated with structural and functional abnormalities of the anterior cingulate cortex (ACC), a cognitive control hub. Further, aging is linked to impaired deactivation of the default mode network (DMN) during cognitive demand, which ACC function with DIF may exacerbate. Thus, using source localization from resting-state EEG, we examined the role of DIF in ACC activity in cognitively healthy elders (n=44, mean age=79.7, 31F). Our focus was the aperiodic exponent, a parameter describing EEG power spectral density slope (1/f^x). The exponent, x, decreases as the slope flattens; this decrease is observed in older age, suggesting loss of neural synchronization. We hypothesized a lower exponent in those with higher DIF (i.e., less synchronization). Instead, we found DIF and exponent were positively correlated in both left and right ACC (r=0.450, p=0.002). Greater resting synchronization of the ACC with DIF may therefore indicate DMN recruitment (i.e., hyperactivity) of frontal control-related neural resources, and subsequently poorer functioning when cognitive control is required. Supporting this interpretation, higher resting aperiodic exponent was associated with poorer performance on an inhibitory control task (r=-0.436, p=0.003). Thus, greater neural synchronization in the resting ACC in high alexithymia may contribute to age-related cognitive decline via exacerbated difficulty downregulating DMN during cognitive demand.

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POSTER SESSION II - 007 | ADAPTATION FOLLOWING CONFLICT: ERP EVIDENCE FROM AN AFFECTIVE FLANKER

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Conflict within a flanker task trial often improves performance on the following trial. Enhancements may reflect strategic adjustments of attentional processing and top-down control elicited by prior incongruency. Stimulus processing and conflict detection may also be facilitated by affective salience of target stimuli. The present study investigates the impact of conflict adaptation effects on affective stimuli, as indexed by N2 and P2 amplitudes. High-density ERPs were collected from 56 participants during a modified Eriksen flanker task using happy and contemptuous faces. Behavioral measures and P2 and N2 amplitudes both showed reliable conflict adaptation effects. Responses following incongruent trials exhibited post-conflict slowing and enhanced P2 amplitude, consistent with enhanced processing of stimuli. N2 amplitude differences between congruent and incongruent trials were attenuated following incongruent trials. Conflict adaptation effects diminished performance differences between trials with happy versus contemptuous targets. Happy targets facilitated performance when preceding trials were congruent, resulting in faster responses, an enhanced P2, and a reduced N2. These differences disappeared following incongruent trials. Findings suggest that conflict adaptation engages control mechanisms that enhance stimulus processing while attenuating biases driven by emotional salience.

POSTER SESSION II - 008 | UNCOVERING THE LOCUS OF THE TEMPORAL UNCERTAINTY WITH LATERALIZED READINESS POTENTIALS

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Reaction time (RT) is prolonged as the foreperiod (FP, the time from warning signal onset until imperative stimulus onset) increases. This is mainly caused by increasing temporal uncertainty (TU) at longer, more difficult to judge, FPs. It is unclear whether TU affects a perceptual, decision, or motoric stage. We investigated this by analyzing both stimulus- and response-locked lateralized readiness potential (LRP) in a choice RT task where FP (600 vs. 3000 ms), response complexity (RC, simple vs. complex response), and discrimination difficulty (DD, high vs. low luminance) were manipulated across blocks. Participants responded to the word “right” or “left” (written in kanji characters) by a simple button press with the corresponding index finger in the simple condition or by a sequence of presses (i.e., index→index→middle finger) in the complex condition. The brightness of the IS was RGB 255, 255, 255 in the high luminance condition and RGB 127, 127, 127 in the low luminance condition. Both RT and the S-LRP interval (imperative onset until LRP onset) were significantly longer in the FP 3000 ms conditions and in the low-luminance conditions. The LRP-R interval (LRP onset until response onset) was only influenced by RC. Therefore, it is concluded that TU affects a premotoric process. In addition, our results also suggest that TU and DD may affect premotor processing independently.

POSTER SESSION II - 009 | VISUO-ATTENTIONAL PROCESSES UNDERLYING SELECTIVE ENUMERATION OF EMOTIONAL FACES

Kei Kobayashi, Tetsuko Kasai
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Previous behavioral studies have demonstrated that emotional faces can be selectively enumerated among simultaneously presented neutral faces; however, the underlying mechanisms of processing facial expressions of each individual of multiple others remain unknown. In prior research with geometric-figure enumeration, larger target numerosity (up to 3–4) enhanced posterior event-related potential (ERP) components lateralized to the target position, such as N2pc (posterior contralateral) and CDA (contralateral delay activity), reflecting the formation of individuated target representations and their maintenance in working memory, respectively. The current ERP study (N = 30) investigated the processes underlying selective enumeration of

emotional faces. Four faces (two in each hemifield) were presented for 200 ms and participants enumerated zero, one, or two happy faces in a target hemifield, while the remaining faces displayed neutral expressions. Behavioral results indicated that participants could selectively enumerate targets. In lateralized ERPs, P1pc, N2pc, and CDA were enhanced with target numerosity, suggesting that individuated representations of happy faces were formed in early to middle processing stages and subsequently maintained in working memory. Furthermore, the effect of target numerosity on P1pc and CDA were modulated by participants' self-reported empathic concern trait, reflecting a bias toward differences in facial expressions and that toward relatively negative expressions, respectively.
FUNDING: JSPS KAKENHI Grant Number 24KJ0316

POSTER SESSION II - 010 | DIFFERENT ROLES OF ANTERIOR AND POSTERIOR INSULA IN SOMATOSENSORY PROCESSING

Yasunori Kotani[1], Mari Yanagi[1], Yoshimi Ohgami[1], Hajime Kageyama[2,5], Nobukiyo Yoshida[3], Hiroyuki Akai[2], Akira Kunimatsu[4], Yusuke Inoue[5]
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Our previous study has shown that the right anterior insula (aINS) responds to stimuli in both the left and right hemispaces, while the left aINS responds only to right hemispace stimuli (Ohgami et al., 2023). This right-hemisphere dominance may underlie hemispatial neglect caused by right hemisphere damage. In the present study, we investigated whether similar right-hemisphere dominance is also observed for somatosensory input. As somatosensory information is known to be processed in the contralateral posterior insula (pINS), activation patterns may differ from those observed with visual stimuli. In this fMRI study, we examined whether contralateral dominance in the pINS or right-hemisphere dominance in the aINS would be observed in response to air-puff stimuli applied to the left or right hands or feet. Thirty-one healthy adults performed a time estimation task. Four seconds after an instruction cue, the participants pressed a button, followed by somatosensory feedback (air puffs: one for correct, two for too early, three for too late) or no feedback. Five conditions were used: L-Hand, R-Hand, L-Foot, R-Foot, and NoFB. Results showed bilateral aINS activation across all conditions, indicating no right-hemisphere dominance. In contrast, the pINS exhibited contralateral activation: left pINS for right-side stimuli and right pINS for left-side stimuli. The findings are consistent with the notion that somatosensory input is processed contralaterally in the pINS, and suggest that the aINS and pINS respond differently depending on stimulus modality.
FUNDING: This work was supported by JSPS KAKENHI Grant Number 15K04182

POSTER SESSION II - 011 | THE EFFECTS OF CANNABIS, ALCOHOL AND CO-USE ON NEUROCOGNITIVE FUNCTIONING AND THE RELATED BEHAVIORAL PATTERNS

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The growing legalization of recreational cannabis brings an urgent public safety concern of driving under the influence. The co-use of alcohol compounds this concern. The present study uses electroencephalography (EEG) recorded during a performance monitoring task to delineate the neurophysiological mechanisms underlying the effects of each intoxicant. Participants (N=30) consumed either alcohol or cannabis, or both. Performance and brain activity measures were obtained during a speeded flanker task before and three times across 4.5 hours post-intoxication. EEG recordings were processed to obtain amplitude and latency values for two brain measures associated with incorrect decisions, error related negativity (ERN), and error positivity (PE). Repeated measures ANOVAs (RM-ANOVA) of performance revealed a non-significant linear trend of decreasing number of errors across time for all groups. A RM-ANOVA for ERN amplitude revealed a significant main effect for Time-Periods ($p=.014$) and a significant interaction for Time-Periods by Group ($p=.026$). Pe amplitude had a significant effect for Time-Periods ($p=.005$). All three groups showed significant quadratic trends of amplitude attenuation across sessions for both ERN and PE ($p< .007$). At peak intoxication, the co-use group showed significantly greater attenuation compared to alcohol or cannabis only groups ($p<.05$). The reduced ERN and PE across conditions highlights inhibitory control deficits caused by alcohol and cannabis. Significant interactions demonstrate differential effects of intoxicants on neurocognitive functioning.
FUNDING: Institute of Cannabis Research, Colorado State University Pueblo (ICR-FY24-Karoly)

POSTER SESSION II - 012 | TASK COMMITMENT INCREASES LEFT-HEMISPHERE REWARD ACTIVITY

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Previous studies have suggested that left hemisphere is involved in the reward processing. Intriguingly, recent researches on reward system indicate that voluntary, effort-based reward acquisition leads to greater activation of the reward system than passive receipt of rewards. Building on these, the present study investigated whether left-hemisphere activity is modulated by the degree of commitment to a task. We conducted two fMRI experiments using a time-estimation task. In both experiments, participants estimated a target duration and pressed a button when they thought that the interval had elapsed. Participants received

monetary rewards for accurate estimations in the Reward condition, but not in the No-Reward condition. In Experiment 1 (N = 25), the information of amount of reward was presented before the task response. In Experiment 2 (N = 31), the same reward information was presented after the response, increasing participants' commitment to the task. fMRI data focused on beta values extracted from the left anterior insula, a region associated with reward processing, evoked by reward information. Results showed that left anterior insula activity was significantly higher in the Reward condition than in the No-Reward condition in both experiments. Furthermore, beta values were significantly higher when the task commitment was enhanced by presenting reward information after the task response. These findings support the notion that left hemisphere activity not only reflects reward processing, but is also modulated by task commitment.

POSTER SESSION II - 013 | SYNTHETIC IMAGE EVOLUTION FOR AFFECTIVE SCIENCE

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Emotions are thought to include subjective, behavioral, and physiological components. Multiple lines of evidence indicate that these components sometimes dissociate from one another, but they currently remain very difficult to study in isolation. Therefore, an experimental method capable of controlling independently different affective components would be very useful to better isolate their origin in the brain. Here, we build on earlier work in macaque and human visual perception to develop a method to create "synthetic" images capable of targeting specific components of a given emotion - in this case, animal fear - by combining an evolutionary algorithm with generative artificial intelligence. In this paradigm, a generative model, Stable unCLIP, produces synthetic images that fall on a low-dimensional subspace representing the visual features of a set of common animals. These synthetic images were presented to 20 participants with moderate-to-high animal fears. Using an evolutionary algorithm, the images were recombined in an iterative manner, on the basis of their "fitness" in driving either subjective fear ratings or skin conductance responses (SCRs). We found that conditioning on fear ratings generated images that strongly drove up fear responses. However, conditioning on SCRs did not produce more fearful images on average, even if the generated images strongly resembled those of the fear ratings condition. As such, this approach may offer an experimental means of disentangling brain processes with correlated, yet distinct, receptive fields.
FUNDING: NSERC

POSTER SESSION II - 014 | GRASPING THE POUCH OF A JELLY BEVERAGE WITH THE LEFT HAND INDUCED RIGHT-HEMISPHERIC ACTIVATION AND CORRECT-RESPONSE MONITORING

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It has been reported that left-hand contraction (LHC) results in contralateral hemispheric activity, and a reduction of alpha power. LHC has been applied to prevent choking during competitions based on previous findings that right-hemispheric activation is optimal for success in closed-skill performance. We investigated if LHC through grasping of a foil beverage package with the left-hand, commonly used by athletes during games can induce right hemisphere activation. If it can induce previously demonstrated optimal brain activity during games, it may be a useful method to prevent choking. Twenty-four participants completed two counterbalanced sessions. Immediately prior to completing a spatial Stroop task (SST) each participant drank a jelly beverage in a pouch with a spout by squeezing it with their left hand (LHC condition). In the control condition they drank the same beverage using a straw. EEGs during the 3-minute rest before and after the task were subjected to fast Fourier transform (FFT) and alpha asymmetry scores (AAS) were calculated. AAS before SST showed a right hemispheric activation in the LHC condition ($p = .003$) but not in the control condition. We also averaged both error-related negativity (ERN) and correct-related negativity (CRN) at FCz during the task. Although ERN amplitude did not differ between the two conditions ($p = .993$), CRN was larger in the LHC condition ($p = .017$). These results suggest that unilaterally grasping the package of a commonly used jelly beverage may enhance contralateral hemispheric activity and correct-response monitoring.
FUNDING: Morinaga & Co., Ltd. Grant

POSTER SESSION II - 015 | NEURAL INDICES OF RISKY DECISION MAKING: ERPS AND ANXIETY

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Anxious apprehension and anxious arousal can frequently co-occur in individuals, yet the influence of each on cognitive processing and behavior is important for understanding how best to treat them. Indeed, each of these trait affects has been associated with different neural regions and cognitive processes (Engels et al., 2007, Heller et al., 1997, Nitschke et al., 1999, O'Hare & Dien, 2008). Most of this research focuses on differences in attention and cognitive control, however, self-report data also suggests that these accumulate into differences in decision-making processes. Participants (n = 50) completed the Balloon Analog Risk Task (BART). In preliminary analyses, unique effects for each trait affect are supported by the data. Anxious apprehension is associated with slower decision-making styles. Correspondingly, increases in anxious apprehension also predict larger Pe amplitudes and P300 amplitudes in response to negative feedback. Increases in anxious arousal, on the other hand, predict smaller P300 amplitudes in response to negative feedback. These findings support ongoing research on the unique neural-cognitive mechanisms underlying different aspects of trait affect and the importance of emotional and cognitive context for understanding these mechanisms. Further, these data build on dual-anxiety models for understanding individual differences in trait anxiety.

POSTER SESSION II - 016 | THE SPATIAL DISTRIBUTION OF REWARD PROCESSING AND ITS IMPLICATION IN DEPRESSION: A HIGH-DENSITY EEG STUDY

Anna Patterson, Kaylee Mercer, Eric Rodell, Abby Morley, Josh Carlson, Lin Fang
Northern Michigan University

Depression is a prevalent mental health disorder. One of the symptoms of depression is blunted reward sensitivity. The association between depression and reward sensitivity is commonly measured in electroencephalography (EEG) studies using an event related potential (ERP) known as the reward positivity (RewP). Research on how RewP changes across the brain and how its spatial distribution plays a role in depression is still scarce. Therefore, this study aims to address this gap in the literature. Participants completed the doors task while continuous EEG was recorded with a 256-electrode cap. Also, participants completed the Depression Anxiety Stress Scale. To measure reward processing, RewP difference (ΔRewP) was calculated between reward and non-reward feedback trials. We found a significant negative correlation between the ΔRewP and the depression scores. We also found that the highest RewP amplitude was at electrode Cz and decreased along the midline moving more anterior. After Bonferroni correction, the correlation between ΔRewP and depression was not significant in the central region, but was significant in the fronto-central scalp location. The findings indicate that the relationship between depression and reward processing is not linearly increased as the function of the ΔRewP. Our research not only provides empirical evidence that blunted RewP amplitudes can be considered a biomarker for depression, but also suggests that the spatial distribution of reward processing plays an important role in detecting the relationship between depression and reward processing.
FUNDING: NSF 2320091

POSTER SESSION II - 018 | AGENCY OVERCOMES EARNING IN SELF-RELATED REWARD PROCESSING

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Humans preferentially process monetary gain for themselves compared to others. This reward-seeking behaviour is linked to our cognitive bias towards self-related information, evidenced by self-related advantages in gambling tasks. However, without agency over our actions, the processing of rewards is greatly reduced, leaving it unclear how decision-making and self-relatedness might interact. Do our reward systems preferentially process self-related outcomes without control over the preceding decision? To test this, we had participants complete two tasks where they made decisions that risked their own or the previous participant's money. Additionally, some trials were not controlled by participants and likewise risked their or the prior participant's money. In the first experiment, participants played Blackjack, a chance-based game where players change their score to earn money. For the second experiment, participants played a learnable stock investment game where they sought to invest in the highest-value stock to earn money. In both experiments, the amplitude of the reward positivity, an event-related component of electroencephalography data reflecting reward processing, was similar for trials that were self-played regardless of whether participants earned money from their choice. More importantly, this advantage was reliant on agency – reward responses were similarly reduced for self- and other-earning trials when participants did not make the decision. Our results demonstrate the necessity of agency for reward processing in both chance-based and learnable environments.
FUNDING: Natural Sciences and Engineering Research Council of Canada

POSTER SESSION II - 019 | ERP INDICES OF INITIAL RESPONSE TO REWARD: REDUNDANCY, UNIQUE VARIANCE, RELIABILITY ACROSS 3 MEASUREMENT OCCASIONS AND GENERALIZATION OF RELIABILITY ACROSS CLINICAL AND DEMOGRAPHIC GROUPS

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Hungarian Academy of Sciences, Research Centre for Natural Sciences

Where data are available on stability of indices of response to reward, explicit tests of generalizability across groups are scarce and little is known about measurement properties of less commonly derived indices. We examined, in adolescents (N=269), whether 16 behavioral and ERP (RewP) indices of response to reward are (1) redundant and (2) account for unique variance. Also, in a subsample of adolescents and young adults (n=140), whether ERP indices are stable across 3 assessments/ 30 months and whether stability generalizes across demographic and clinical groups. Findings indicated the indices (1) are not redundant; τs adjusted for age, birth sex, and depressive problems range: -.307-.779, 75th percentile:.242. (2) Account for unique variance; EFA suggested f1 (gain and loss): amplitude, peak-to-peak amplitude and intra-subject variability of latency; f2 (gain) and f3 (loss): intra-subject variability of amplitude and jitter of latency; f4 (gain and loss): intra-subject variability of latency; f5 behavioral indices. (3) Are stable; ICCs were good-excellent (.629-.860). Stability generalized across n=81 boys (.599-859) and n=59 girls (.610-.862) but less so across clinical groups. In low ADHD (n=88), ICCs were good-excellent (.593-.881; 50% in excellent range). In high ADHD (n=52), ICCs were fair-excellent (.464-.819; 25% in excellent range). Results suggest examined indices 1) reflect different but related processes and 2) are stable across late adolescence and young adulthood, irrespective of birth sex but variably across ADHD levels.
FUNDING: MTA Lendület ("Momentum") Grant LP2018-3/2018

POSTER SESSION II - 021 | SENSORY PROCESSING IN NEUROTYPICAL CHILDREN: THE INFLUENCE OF SOCIOECONOMIC STATUS ON BEHAVIOR AND BRAIN

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Sensory processing (SP), the ability to register/modulate/organize sensory information, is critical for cognitive and motor development. Impairments in SP affect 5–16.5% of the population and can impact learning. While the causes of Sensory Processing Disorder (SPD) remain unclear, environmental factors, including socioeconomic status (SES), are believed to influence sensory processing development. However, research on SES and SP remains limited. Aim: Examine the relationship between SES and SP in neurotypical children while accounting for age and neural correlates obtained with electroencephalography (EEG). Methods: Participants were 53 neurotypical children (ages 5–13). Parents completed the Short Sensory Profile (SSP). SES was measured by parental education and income-to-needs ratio. EEG data were collected using a sensory registration paradigm to obtain N1 latency in four auditory stimuli (1 kHz and 3 kHz, soft/loud). Results: Higher parental education correlated with shorter N1 latency ($r = -0.24$, $p = 0.042$) and higher SSP scores ($r = 0.23$, $p = 0.047$). N1 latency was negatively correlated with income-to-needs ratio ($r = -0.24$, $p = 0.044$) and age ($r = -0.30$, $p = 0.014$). Age and SSP score were not significantly correlated. Discussion: Faster neural responses and better SP were linked to higher SES, aligning with a previous study of longer N1 latency in individuals with SP challenges. Results indicate environmental factors, such as SES, are associated with both neural and behavioral measures of SP.

POSTER SESSION II - 022 | EFFECTS OF "THIN IDEAL" EXPOSURE ON SELF REFERENTIAL PROCESSING YOUNG CISGENDER WOMEN : AN ERP STUDY

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University of Alberta

Women's internalisation of the "thin-ideal" body type commonly portrayed in media has been linked to more negative body image, higher self-consciousness, and lower self-esteem. However, it is unclear how thin-ideal exposure modulates women's brain activity when they process information about themselves (i.e., self-referential processing). We recruited 60 18-24-year-old cisgender women and randomised them to two groups. The two groups were presented with images of women with high or low conformity to the thin-ideal body type, respectively. Participants first evaluated these images on body figure attractiveness and their own body figure's similarity to the body in each image. Next, they completed a self-referent encoding task (SRET) to gauge their self-referential processing of negative and positive body-related (e.g., slim) or generic (e.g., insecure) self-descriptors, while their electroencephalogram (EEG) was being recorded. We compared the two groups in the late positive potentials (LPP) elicited by the SRET, an identified bio-marker of more elaborate, deeper processing of motivationally salient information. We found that the thin-ideal group showed a potentiated LPP to body-related descriptors compared to the non-thin-ideal group. This suggested that thin-ideal exposure led to more in-depth processing of body-related self-referential stimuli in young cisgender women. Our findings will promote our understanding of the neurocognitive mechanisms underlying thin-ideal internalisation and inform measures that promote positive body image and well-being in young women.
FUNDING: NSERC

POSTER SESSION II - 023 | EEG CORRELATES DURING THE EMOTIONAL PROCESSING OF PERSONALIZED SHORT-VIDEO CONTENT AND INTERNALIZING SYMPTOMS IN YOUNG ADULTS

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University of Texas at Dallas

Time spent on social media is linked to more internalizing symptoms, but users with similar screen time may receive varied algorithm-generated content. To date, little is known about how individuals process such content and how it relates to mental health. This study addressed the gap by examining associations between personalized short-video content and frontal alpha asymmetry (FAA), the difference in alpha EEG power between left and right frontal regions, reflecting emotional processing and depression risk. We also examined the link between FAA and internalizing symptoms. Fifty-seven young adults (78.9% females, mean age=20.23) completed a short-video task with EEG recording, in which they watched 32 personally recommended videos extracted from their Instagram or TikTok account and 32 generalized videos from new user accounts. A content analysis was used by two coders to categorize personalized videos using Shutsko (2020)'s system. Participants also completed a scale on anxiety and depression. Results adjusting for sex and weekly short-video app screen time showed that adults who watched fewer positive relationship videos displayed more right frontal alpha activation (associated with negative affect) when viewing personalized, but not generalized, videos. More right frontal alpha activation was, in turn, associated with higher depression scores. The indirect effect linking algorithm-generated content to depressive symptoms through FAA suggests that algorithms may reinforce emotional content and processing on social media, as well as pre-existing depressive symptoms.
FUNDING: University of North Texas and University of Texas at Dallas social science seed grants

POSTER SESSION II - 024 | ASSOCIATIONS BETWEEN INFANT DELTA-BETA COUPLING AND NEGATIVE AFFECTIVITY: A MULTI-METHOD STUDY

Josephine Levy, Lidia Panier, Zhixin Zhou, Anna Weinberg
McGill University

Identifying early markers of risk can advance our understanding of pathways to anxiety. A candidate neural marker of anxiety in adults is delta-beta coupling (DBC), the correlation between delta and beta neural oscillations derived from electroencephalography (EEG). DBC reflects cortico-subcortical interactions implicated in effortful emotion regulation. Increased DBC was found in children at risk for anxiety and in preschoolers with high dysregulated fear. However, whether DBC is associated with precursors of anxiety in infancy, namely, negative affect, remains to be explored. The present study examined associations between infant DBC and negative affect. Infants aged 7 months ($N = 69$) completed a resting-state EEG session to measure DBC. Infant negative affect was measured through a multi-method approach: a mother-report

questionnaire and two laboratory-based observations (a free play session with mom and a stranger approach task). To examine associations between infant negative affect and DBC, we examined whether infant negative affect measures moderated the relationship between delta and beta. We found that mother-reported infant negative affect (□ = .29) and negative affect observed during free play (□ = .43) significantly predicted increased DBC. A similar, though not significant, association was observed with behavior during the Stranger task (□ = .23). These results show that DBC is consistently associated with multiple independent measures of infant negative affect, pointing to DBC as a candidate marker of risk for anxiety that can be observed in infancy.
FUNDING: NSERC RGPIN-2017-04329; "Electrocortical and hormonal responses to threat across development" NSERC RGPIN-2024-04803; "Ecological Neuroscience and the Developing Brain: micro- and meso-level influences on neural and behavioral measures of infant and adolescent executive functioning"

POSTER SESSION II - 025 | ABNORMAL BRAIN ELECTRICAL ACTIVITY IN A VISUOSPATIAL WORKING MEMORY TASK DISTINGUISHES CHILDREN WITH DEVELOPMENTAL VISUAL-SPATIAL DISORDER (DVSD) FROM THOSE WITH AUTISM SPECTRUM DISORDER (ASD) AND TYPICAL DEVELOPMENT

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DVSD is a neurodevelopmental disorder with deficits in visuospatial abilities but not in reading or verbal abilities, at present not recognized by the main diagnostic systems. Individuals with ASD have dominant deficits in social functioning, but also, at a lesser degree, in visuospatial processing. A better understanding of its neural correlates may provide evidence for identifying DVSD as a discrete disorder. The present study recorded 256-chan EEG in 9-15 years old children with DVSD (N=16), ASD (N=16) and TD (N=16), during the performance of the spatial capacity working memory task (SCAT). Subjects saw a target array of 1-7 circles (500 ms), and after a 3 s delay a single circle in the same or a different position as one of the target circles. Event-related potentials (ERPs) were computed to the onset of the target array. ERP analysis was performed with a mass-univariate approach in the P1 (0-130 ms), the P2 (130-210 ms) and the P3 windows (210-350 ms). RT accuracy was significantly lower in DVSD than the other two groups. For the ERPs, in the P1 window both DVSD and ASD differed from the TD group, with amplitude changes over parietal and occipital scalp, respectively. In the N1 time window, the DVSD group significantly differed from both the TD and the ASD groups for voltage changes over the right frontal region. In the P3a time window the DVSD group significantly differed from the TD group over the right frontal al parietal regions. The right frontal abnormalities in DVSD group are consistent with evidence that DVSD may differentially affect right frontal regions.

POSTER SESSION II - 026 | EFFECT OF PRE- AND POST-NATAL ANEMIA ON INFANT VISUAL EXCITATION/INHIBITION BALANCE OVER THE FIRST 2 POSTNATAL YEARS

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In non-human animal models, a decrease in excitation to inhibition (E/I) balance initiates tightly-regulated windows of elevated neuroplasticity in early life – sensitive periods – and governs degree of neuroplasticity during this period. Until recently, measuring E/I balance noninvasively was infeasible, limiting understanding of human E/I balance during infancy. We noninvasively estimate E/I balance in human infancy using the aperiodic exponent of electroencephalography power in an occipital region via spectral parameterization in a longitudinal (726 obs.) cohort of 293 infants at 4 postnatal visits (M age (days): visit 1=125, v2=269, v3=427, v4=654) using HAPPE and the integrated FOOOF wrapper. We investigate how prenatal and postnatal hemoglobin levels, indexing anemia, shape EEG markers of E/I balance in an early visual sensitive period. Serum hemoglobin (Hb) was collected from mothers in trimester 3 (M GA=34 wks) and infants at 4 mo. (M=117 days). Two longitudinal multilevel models tested how continuous Hb shapes the aperiodic exponent. No significant effects in the prenatal model were observed. In the postnatal model, 4-month Hb was positively related to larger aperiodic exponents (b=0.09, SE=0.04, t(439.47)=2.08, p=.038), suggesting that early postnatal anemia is linked to decreased inhibition and potentially delayed neuroplasticity, therefore less mature visual neurodevelopment. Future work will incorporate longitudinal Hb measures from pregnancy and the first 2 years of life as well as probe etiology of anemia in the sample with iron and inflammation measures.
FUNDING: Wellcome Leap 1kD Program to KD and LGD

POSTER SESSION II - 027 | ADOLESCENT SOCIAL STRESS AND DEPRESSION: INTERACTIONS WITH THE REWARD POSITIVITY (REWP) TO MULTIPLE REWARD TYPES

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McGill University

Exposure to social stress increases in adolescence, contributing to increases in depression; however, not all adolescents with heightened stress exposure develop depression. Thus, it is useful to identify those who will be the most susceptible to stress. One well-established risk marker for depression is a blunted Reward Positivity (RewP); however, most work has elicited the RewP using monetary rewards. Evidence on how adolescents' neural response to category-specific rewards (monetary, food, and social) interact with social stress to predict depressive symptoms remains inconclusive. In this study, 234 adolescents (age 9-16,

M = 12.08) completed three electroencephalogram (EEG) tasks designed to elicit the RewP in response to monetary, social, and food rewards. Participants also completed the UCLA Life Stress Interview (UCLA-LSI) from which we combined the peer and family domains to measure social stress severity. Based on prior literature, we expected to see the strongest interaction between the RewP to social rewards with social stress severity in predicting depression. We observed significant interactions, such that a blunted monetary and food-related RewP and greater social stress predicted greater self-reported symptoms of depression. Interestingly, this interaction was not significant for the social RewP. These findings are cross-sectional, and the causal direction of effects remains unclear. Our results support the multidimensional nature of reward sensitivity, suggesting the need for consideration of multiple indices of risk when studying adolescent depression.
FUNDING: CIHR Project Award # 427055 ("Threat and reward sensitivity as markers of stress susceptibility in adolescence: Identifying predictors of anxiety and depression")

POSTER SESSION II - 028 | BIDIRECTIONAL EFFECTS OF PARENTING BEHAVIORS AND CHILD NEURAL DEVELOPMENT IN RESTING-STATE ALPHA/DELTA RATIOS

Marybeth McNamee, Rebecca Brooker
Texas A&M University

The first interpersonal relationship most children form is with their parents. Parenting behaviors influence child development in well established parent-to-child effects (Bernier, Calkins, & Bell, 2016), but the impacts of child development on parenting behaviors (child-to-parent effects) are understudied. The mechanisms by which bidirectional effects of the parent/child relationship may manifest are even less well understood. One possibility is that parent behaviors reflect efforts from parents to respond to real or perceived needs and abilities in offspring. Notably, critical developmental advancements in early life are supported by neural processes that are likely to both elicit and respond to parent behavior (Feldman, 2015). Thus, neural maturation itself is one possible mechanism for early bidirectional effects. We tested this possibility in a longitudinal sample of children (N = 117, 47 males) and parents at child ages 3, 4, and 5. Neural maturation was quantified using a ratio of total Alpha to Delta power (ADR) derived from a 5-minute baseline EEG. Parent behaviors were assessed via self-report and observations. A cross-lagged panel model revealed that less mature child ADR at age 3 predicted greater self-reported maternal insensitivity at age 4 (child-to-parent; $\beta = -.18$, $p = .05$); greater observed insensitive parenting at age 4 predicted a less mature child ADR at age 5 (parent-to-child; $\beta = -.24$, $p = .05$). Findings indicate a likely role for neural maturation in a truly bidirectional association between child development and parents' behaviors.
FUNDING: NIH K01-MH100240

POSTER SESSION II - 029 | RESTING BRAIN ACTIVITY ACROSS EARLY CHILDHOOD: ASSOCIATIONS WITH MATERNAL DEPRESSION AND SOCIOEMOTIONAL BEHAVIOUR PROBLEMS IN LOW-INCOME FAMILIES

Olivia Merulla, Aislinn Sandre
University of Western Ontario

Maternal depression increases the risk of socioemotional difficulties in children, particularly among those living in poverty. However, the pathways through which this risk emerges remain unclear. One potential pathway is through alterations to the normative development of brain function in early childhood. This longitudinal study examined whether maternal depressive symptoms were associated with differences in resting brain activity during early childhood (N=166), and whether these neural differences were linked to socioemotional behaviour problems in children living in poverty in the U.S. Maternal depressive symptoms were assessed at 1, 2, 3, and 4 years and combined into a composite score. Children's resting electroencephalography (EEG: theta, alpha, beta, and gamma power) was recorded at ages 1 and 4, and socioemotional behaviour problems were reported by mothers at age 4. Linear mixed-effects models tested the interaction between time (1 vs. 4 years) and maternal depressive symptoms (grand-mean centered) on children's EEG power. Children of mothers with lower depressive symptoms showed an increase in alpha power from age 1 to 4, whereas those with higher depressive symptoms showed a smaller increase. These effects were specific to alpha power, not theta, beta, or gamma power. Moreover, lower alpha power in children at age 4 was associated with more socioemotional behaviour problems. These results suggest that maternal depression may increase risk for socioemotional difficulties by altering the development of brain function among children living in poverty.
FUNDING: This research uses data from the Baby's First Years study. Research reported in this abstract was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health under Award Number R01H

POSTER SESSION II - 030 | MOTHERS' AND INFANTS' LATE POSITIVE POTENTIAL RELATE TO EACH OTHER'S ANXIETY

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Bidirectional anxiety transmission between mothers and infants has been theoretically linked to dysfunction in neural processing of negative emotion, though direct tests are lacking. To initiate empirical examinations of this effect, we tested concurrent relations among maternal and infant late positive potential (LPP) and anxiety at infant age 1, results of which can support future longitudinal analyses of LPP as a mechanism of dyadic anxiety transmission. Participants included 177 1-year-old

infants (79 female) and their mothers. LPP was derived from infants' and mothers' EEG recordings while viewing negative (angry) and neutral faces. Negative LPP was residualized on neutral LPP. Anxiety symptoms and risk, for mothers and infants respectively, were assessed both observationally (infants: social fear behaviors during a Stranger Approach task; mothers: quality of presentation during a 3-min speech task) and via maternal surveys (parent report on infants and self-reports). Correlations existed for maternal LPP and mother-reported infant anxiety ($r = -.21$, $p = .054$) and between infant LPP and observed maternal anxiety ($r = -.23$, $p = .064$). In regression analyses, maternal LPP related to reported infant anxiety ($B = -.25$, $p = .027$) above and beyond maternal self-reported anxiety, and infant LPP trended towards relating to observed maternal anxiety ($B = -.24$, $p = .063$) above and beyond maternal perceptions of infant anxiety. LPP in one member seems to have a unique relation to anxiety in the other.
FUNDING: R01 MH113669

POSTER SESSION II - 031 | REGULATE YOUR DISTANCE: HOW FEELINGS OF CLOSENESS VARY WITH FACIAL MIMICRY AND PHYSIOLOGICAL SYNCHRONY

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Victoria University of Wellington

Regulating personal space is an important feature in social interactions and seems to depend on context and individual characteristics. Variations in expressing emotional states and reading them in an interaction partner might be crucial for feelings of closeness. But how do people regulate personal distance and facial mimicry in interpersonal interactions, and how does that relate to physiological synchrony? We investigated interactions in 38 dyads (familiar or strangers) tasked to chat about two positive and two negative life events. Skin conductance (SCL), heart rate (HR), full-body motion and facial expressions were captured during the interactions, along with participants' reported feelings of closeness to each other before and after the interactions. Physiological and facial synchrony were calculated from windowed cross-correlations tested against randomness. We found significant synchrony between dyadic partners during positive but less during negative topic conversations for HR and SCL as well as for facial mimicry. In addition, HR-based and SCL-based synchrony were positively correlated. Feelings of closeness before the interactions were positively related to physiological and facial synchrony but negatively related to the change in feelings of closeness from before to after the interactions. These findings indicate that higher initial closeness feelings, linked to being familiar rather than strangers, were related to higher physiological synchrony, which did not improve across the conversations.

POSTER SESSION II - 032 | TEMPORAL DYNAMICS OF MIXED EMOTIONS: COMPUTATIONAL MODELING REVEALS PREDOMINANT CONCURRENT PATTERNS OF EMG-DERIVED NEGATIVE AND POSITIVE AFFECTIVE ACTIVATION

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Mixed emotions, characterized by the co-occurrence of negative affect (NA) and positive affect (PA), may exhibit complex temporal dynamics. Understanding these dynamics is crucial for emotion research. This study computationally modeled five distinct dynamic emotion patterns: Highly Simultaneous, Prevalence, Sequential, Inverse, and Vacillation Patterns. The aim was to characterize the temporal dynamics of mixed emotions and to identify which pattern(s) best capture(s) the NA-PA interplay. Dynamic patterns were modeled using Gaussian and sigmoid functions. Their fit was tested on data from 42 women who watched 20-30 s ambivalent film clips while facial electromyography of corrugator supercilii and zygomaticus major muscles was recorded as objective indicators of NA and PA system activation, respectively. Chi-squared tests showed significant differences in best-fitting pattern frequency ($p < 0.01$). Pairwise comparisons indicated that Highly Simultaneous (38.4%), Inverse (24.3%), and Prevalence Patterns (23.3%) did not differ but more frequently best fit than Vacillation (10.5%) and Sequential Patterns (3.5%; all p's < 0.05). Stimulus specificity analysis showed significant variation in best-fitting pattern distribution across clips ($p < 0.05$). Our findings suggest that predominant concurrent affective patterns best capture mixed emotions dynamics, indicating NA and PA activation often co-occur with high temporal synchronicity. Further research with additional physiological and neural measures will enhance the understanding of emotion dynamics.
FUNDING: PBGEP1-125914, PA00P1_139593, PBFRP1- 127896, PA00P1_136380

POSTER SESSION II - 033 | REGULATING MIXED EMOTIONS: THE ROLE OF EMOTION GOALS ON EXPERIENTIAL, EXPRESSIVE, AND PHYSIOLOGICAL RESPONSES

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Mixed emotions are common, but the effects of their regulation are unclear. To understand the interplay of emotional experience, expression, and physiology, we propose a three-dimensional extension of the Evaluative Space Model. We test if negative and positive emotion goals when reappraising ambivalent stimuli (disgusting-amusing) differently shape negative affect (NA) and positive affect (PA) system reactivity. A repeated-measures design involved 48 women viewing 20-30 second film clips while responding naturally (no goal) or emphasizing the clips' negative or positive aspects (negative and positive emotion goal). We assessed self-reported feelings (negative, positive), facial muscle

reactivity (corrugator supercilii, zygomaticus major electromyography), and autonomic responses (pre-ejection period [PEP], respiratory sinus arrhythmia [RSA]). Compared to baseline, unregulated mixed emotions evoked NA-PA co-activation (increased negative and positive feelings, corrugator and zygomaticus reactivity, and RSA). Compared to no goal, negative emotion goals caused reciprocal NA-PA activation (increased negative and decreased positive feelings, increased corrugator and decreased zygomaticus reactivity, shortened PEP); positive emotion goals caused reciprocal PA-NA activation (decreased negative and increased positive feelings, decreased corrugator and increased zygomaticus reactivity, no PEP or RSA difference). Findings suggest that emphasizing either negative or positive aspects of mixed-emotion stimuli by reappraisal can shift experience and expression in the desired direction.

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POSTER SESSION II - 034 | INVESTIGATING ASSOCIATIONS BETWEEN VARIATION IN CARDIOVASCULAR REACTIVITY AND EMOTIONAL GRANULARITY IN DAILY LIFE

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We examined how the degree of change in cardiovascular features during daily life relates to one's ability to experience emotions with specificity and precision, or emotional granularity. Previous work from our lab has shown that people experience a wide range of cardiovascular changes during daily life, which map onto their reported emotions in a many-to-many fashion. Here, we propose that those with higher emotional granularity, may have a higher variance of cardiovascular changes during daily life. To test this, we used daily ambulatory physiology and emotional granularity across 14 days (n = 46), during which subjects received self-report prompts based on substantive changes in interbeat interval (IBI). At the end of each day, emotion adjective ratings were made for each prompt instance; intraclass correlations between ratings were used to calculate daily emotional granularity. We constructed a linear mixed effects model to assess if daily emotional granularity was related to the variance of the reactivity of six physiological features (IBI, respiratory sinus arrhythmia, pre-ejection period, left ventricle ejection time, stroke volume, & cardiac output). Change score variance for cardiac output (the amount of blood ejected from the heart per min) was positively associated with daily emotional granularity ($b = 0.03$, $p < 0.05$). As expected, on days when an individual has higher emotional granularity, they also tended to have higher variance in their cardiac output.

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POSTER SESSION II - 035 | AFFECTIVE PROCESSING IN PREADOLESCENTS WITH A FAMILIAL RISK FOR DEPRESSION: INSIGHTS FROM ERPS

Libera Ylenia Mastromatteo, Carola Dell'Acqua, Sara Scrimin, Daniela Palomba, Nicola Cellini, Simone Messerotti Benvenuti
University of Padua

Offspring of depressed parents have about a two-fold risk of developing depression. Affective processing may uncover this intergenerational transmission, as reduced motivated attention to emotional stimuli is linked to depression in adults. Yet, little is known about how these patterns manifest in at-risk youth. Additionally, affective processing involves multiple stages (i.e., anticipation and elaboration) that are understudied in depression risk. Therefore, the main aim of this study was to investigate attentional allocation (Cue-P300), anticipation (SPN), and emotional processing (LPP1, 300-1000ms; LPP2, 1000-2000ms) as potential depression vulnerability markers in a sample of preadolescents with (n=19) and without (n=17) familiarity for depression, using an emotional S1-S2 task with EEG recording. In the early phase of motivated attention (LPP1), controls showed greater amplitudes for unpleasant vs. neutral and a slight increase for pleasant vs. neutral images. The at-risk group showed enhanced LPP1 for unpleasant vs. both neutral and pleasant and for pleasant vs. neutral images. In the sustained phase (LPP2), only the at-risk group displayed larger LPP2 for unpleasant than pleasant and neutral images, with greater LPP2 to unpleasant images compared to controls. No other significant effects emerged. To summarize, familiar risk for depression in preadolescents was linked to heightened motivated and sustained attention to unpleasant pictures. This study shows how ERPs reveal affective processing in depression risk, aiding early detection and guiding prevention strategies.

POSTER SESSION II - 036 | CORTISOL STRESS REACTIVITY AMONG SEXUALLY DIVERSE COUPLES

Silke Jacmin-Park, Sophie Bergeron, Robert-Paul Juster
Université de Montréal

Positive romantic relationships are linked to better physical health via stress buffering. A small number of studies have used laboratory-based stress paradigms to examine salivary cortisol secretion among couples exposed to stress, but to date, findings have been partial and inconsistent. Notably, although research has consistently shown sex differences in stress reactive cortisol, sociocultural gender and sexual orientation have also been related to variability in stress reactivity. Yet, couples representing sexual and gender diversity (SGD) have received little attention among these studies. The current study aimed to examine cortisol reactivity among a diverse sample of 101 couples (202 participants), including 42 SGD couples. Couples took part in a two-hour laboratory visit during which one partner was subjected to a psychosocial stress task, the Trier Social Stress Test (TSST), and the other acted as a support during filmed couple discussions occuring before and after the task. Both partners provided 7 saliva samples throughout the visit. Mixed linear models were used to compare couples' cortisol secretion across time points. Results

showed SGD couples presented lower cortisol secretion following the TSST than did cisgender heterosexual couples (20-50 minutes post-TSST; ps = .026-.035). These findings suggest SGD couples may present better recovery from stress than cisgender heterosexual couples, which is in line with past research showing social and community support may be uniquely beneficial in coping with stress among SGD individuals.
FUNDING: This research is supported by a Canada Research Chair (Sophie Bergeron), the Canadian Institute of Health Research (Robert-Paul Juster) and a doctoral fellowship from the Canadian Institutes of Health Research (Silke Jacmin-Park).

POSTER SESSION II - 037 | TIME-VARYING CHANGES IN VISUOCORTICAL TUNING DURING AVERSIVE CONDITIONING AND EXTINCTION: TRIAL-BY-TRIAL SSVEP ANALYSES AND PERSISTENCE AND FLEXIBILITY OF SENSORY PLASTICITY

Judith Cediel Escobar, Laura Ahumada, Andrew Farkas, Faith Gilbert, Hannah Engle, Andreas Keil
University of Florida

Threat learning induces dynamic adaptations in sensory cortical processing, yet the fine-grained temporal evolution of these changes remains poorly understood. In this study, we used electroencephalography and steady-state visual evoked potentials (ssVEPs) to track trial-by-trial visuocortical responses during aversive conditioning and extinction. Participants viewed phase-reversing Gabor gratings of varying orientations, with one orientation (CS+) consistently paired with an aversive noise during the acquisition phase. Early during acquisition on Day 1, visuocortical responses exhibited broad generalization, with enhanced activity across multiple orientations. As learning progressed, neural responses became progressively sharpened, showing selective amplification of the CS+ and suppression of neighboring stimuli, consistent with a lateral inhibition model. Immediate extinction learning resulted in a rapid decrease in overall visuocortical activity and a reduction in tuning. Importantly, incorporating data from Day 2 revealed a partial reinstatement of CS+-specific sharpening after a 24-hour consolidation period, despite prior extinction. Single-trial analyses confirmed dynamic fluctuations in tuning across learning phases, suggesting that sensory cortical plasticity initially generalizes broadly, refines through associative learning, and can persist beyond extinction. These findings demonstrate the flexibility and durability of visuocortical threat representations, highlighting the sensory cortex as a key node in the consolidation and spontaneous recovery of fear memories.
FUNDING: NIH

POSTER SESSION II - 038 | REDUCING THE COMPLEXITY OF THE EXPERIMENTAL DESIGN ATTENUATES TRAIT-LEVEL EFFECTS IN THREAT SAFETY DISCRIMINATION LEARNING

Justin Lazzarino, David Johnson
The City University of New York

Trait measures of negative emotionality have been shown to play a role in shaping fear learning, however, these effects have not been observed consistently. It has been suggested that individual differences are more likely to surface in strong situations, referring to unambiguous experimental designs that uniformly guide response sets across individuals, and less likely to surface in weak situations, which are less well-defined events with more numerous and/or less predictable stimuli, leading to heightened inter-individual variability and increased sensitivity to capture individual differences. Given that minimal research has directly tested this idea in the context of fear learning we used a traditional Pavlovian fear learning design (n = 105) to test if individual difference effects are mediated by experimental complexity, which was manipulated by using a two-cue (strong) vs three-cue (weak) design. We observed a negative association between inhibitory Intolerance for Uncertainty (I-IU) and threat-safety discrimination in the weak, but not in the strong, situation. This data highlights a few key takeaways. For one, fear researchers interested in optimizing studies for detection of individual differences should consider avoiding overly simplistic designs. Second, characteristics of the experimental design may constitute a crucial factor that can partly explain disparate individual differences results observed in the relevant literature. Finally, further research will be needed to precisely delineate what elements of the experimental design this effect is dependent upon.
FUNDING: 1R15MH134219-01A1

POSTER SESSION II - 039 | SYSTEMATIC REVIEW AND META-ANALYSIS: IMPACT OF UNIPOLAR DEPRESSION ON P300 AMPLITUDE AND LATENCY

Nicholas Santopetro[1], Brittney Thompson[1], Andrew Garron[1], Lauren Keith[1], C.J. Brush[2], Brad Schmidt[1], Greg Hajcak[3]
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The P300 event-related potential (ERP) component has been extensively investigated over the past four decades to elucidate the underpinnings of cognitive dysfunctions in depression. Many studies have observed reduced P300 amplitude and prolonged P300 latency in individuals experiencing depression. The current study includes a comprehensive systematic quantitative review of the depression and P300 literature from 1981 to 2023. Included articles quantitatively measured depression and P300 amplitude or latency. In total, 127 studies (total N =12,722) comprised the current analyses (i.e., 116 examining P300 amplitude and 51 examining P300 latency), resulting in 601 effect sizes (i.e., 464 depression and P300 amplitude; 137 depression and P300 latency). Robust variance meta-regression results revealed a significant negative effect size (r = -.15) between P300 amplitude and depression even after correcting for publication bias. There was a similar significant positive effect size (r = .15) between P300 latency and depression. Findings from moderator analyses indicated that stimulus modality, medication use, and age impacted the P300 amplitude and depression effect size; no moderators of the P300 latency and depression relationship were observed. The current quantitative review confirms significant differences in P300 (both amplitude and latency) attributed to cognitive dysfunctions common in depression as well as guide future study designs and methodological approaches.

POSTER SESSION II - 040 | A META-ANALYTIC REVIEW OF SPORT-RELATED CONCUSSIONS AND EVENT-RELATED BRAIN POTENTIALS

Melissa Materia[1], C. J. Brush[2], Gabe MacAlevy[2], Cassidy Brown[3], Ryan Olson[1]
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Previous research investigating the effects of sport-related concussion (SRC) on neurocognitive function has predominantly relied on self-report assessments to evaluate symptom severity and recovery trajectories. More recently, researchers have explored the use of neurophysiological measurements, such as event-related brain potentials (ERPs), to obtain objective insights into brain function. Most SRC studies have evaluated the N2 and P3 components, which will be the focus of this review. The purpose of this meta-analysis is to synthesize the current literature on ERP alterations following SRC, evaluate the utility of ERPs as biomarkers of neurocognitive recovery, and identify methodological limitations and directions for future research. Thirty articles (out of 595 screened) met inclusion criteria for the final analysis. Individuals with a history of SRC had decreased P3 amplitude, mean difference μ^ = -0.827 (95% CI = -1.617, -0.038) compared to those without a history of SRC. Mean differences in P3 latency (μ^ = 0.283 [95% CI = -0.038, 0.605]), N2 amplitude (μ^ = 0.048 [95% CI = -0.544, 0.641]), and N2 latency (μ^ = 0.119 [95% CI = -0.241, 0.479]) were not significantly different between SRC groups. Overall, SRCs appear to exert significant long-term effects on cognitive domains such as attention and working memory, as evidenced by reductions in P3 amplitude among individuals with a history of SRC. The findings of this meta-analysis consolidate prior statistical evidence in the field and are intended to inform the design and direction of future research initiatives.

POSTER SESSION II - 041 | A NOVEL PARADIGM FOR ASSESSING BRAIN ACTIVITY DURING UPDATES TO WORKING MEMORY

Daniel F. Morris, A. Blythe LaGasse, William Gavin, Patricia Davies
Colorado State University

The P3 component has been associated with the updating of working memory in several tasks. However, other ERP components may also be involved. This study introduces a novel task, a simple Memory Update Paradigm, designed to assess brain activity related to working memory. Adult participants (N=31) were presented with a series of even and odd single-digits each at 50% probability and asked to respond with a button press after the presentation of the third consecutive odd number. We hypothesized that amplitudes would increase across stimulus type (even digits, 1st-Odd, 2nd-Odd, and target 3rd-Odd number) reflecting memory updating. N1 and P3 in averaged stimulus-locked ERPs, created before and after applying an adaptive woody filter, were measured using averaged voltage window (AVW), baseline-to-peak (B2P), peak-to-peak (P2P) procedures. Repeated measures ANOVAs showed that pre woody filter, mean N1 amplitudes are significantly more negative ($p = .005$ for B2P; $p = .044$ for P2P) and P3 more positive ($p < .001$ for both B2P and P2P) as the stimuli approached the target trial, but not for AVW. Post woody filter, mean N1 amplitudes are significantly more negative across stimuli ($p = .04$ for P2P, but not for B2P, $p = .36$, or AVW, $p = .12$). Mean P3 amplitudes significantly increased ($p < .001$) for all three measurement procedures. These findings suggest this novel paradigm can effectively measure changes in brain activity for simple working memory updating. However, the interpretation of N1 and P3 measures depends on the precise measurement procedure used to ascertain true effects.

POSTER SESSION II - 042 | INVESTIGATING THE EFFECTS OF MAGNITUDE OF SOCIAL REWARD AND SOCIAL MEDIA USAGE ON REWARD POSITIVITY AND LEARNING

Cecelia Bauer, Darin Brown
Pitzer College

Widespread social media (SM) usage has sparked concerns regarding its impact on mental health and whether problematic engagement could constitute a behavioral addiction. Given that addiction involves the brain's reward pathways and learning mechanisms, understanding how SM interaction shapes neural responses to social rewards is crucial. The Reward Positivity (RewP) is particularly relevant as it reflects reward learning, a process central to addiction development. To explore this, our study employed a novel EEG task where participants chose between image pairs, each linked to varying "social reward ratios" mimicking common social media "likes." Participants earned points if their selection matched the majority opinion and lost points if it aligned with the minority. This design allowed us to examine how both the magnitude of the social reward ratio and an individual's self-reported time spent on SM influenced the RewP amplitude. Our findings revealed that RewP amplitude significantly increased with higher social reward ratio magnitudes, even when the immediate feedback (points gained) was identical, suggesting that aligning with a larger majority is inherently rewarding. Furthermore, we observed a statistically significant negative correlation: individuals with higher SM usage showed reduced RewP amplitude in response to high social reward feedback. These findings provide insights into the neural mechanisms by which SM engagement shapes reward processing, suggesting a potential pathway for the development of problematic use through desensitization to social rewards.

POSTER SESSION II - 043 | REAL-TIME EMOTIONAL MONITORING: A CONSTANT DIMENSION APPROACH

Shane McClafferty, Bruce Friedman
Virginia Tech University

Emotional assessment has been explored using variations in 30s–5min intervals. Real-time algorithms demand costly computations, large datasets, machine learning, or subject-specific calibration. Instead, emotional dimensions may directly link to basic physiological measures. The present study was devised to measure such predictors while collecting validation measures for valence, motivation (approach-avoidance), and activation/

arousal. The predictors from photoplethysmography (PPG) included frequency domains (Very-high/low frequency; VHF, HF, LF, VLF) of inter-beat intervals (IBI), pulse volume amplitude (PVA), and other IBI variability measures (e.g., RMSSD, SDNN). Motivation was validated via joystick movements (push = avoid, pull = approach), valence via EMG (zygomaticus – corrugator), and activation via eye aspect ratio. Recordings were acquired from 23 undergraduates while they watched six emotional films (fear, anger, sad, joy, amused, content). Unique predictors of each dimension were determined from a multivariate partial least squares model with all PPG-based calculations and subject as random effects. The top ten predictors were entered into mixed-effect linear models to identify significant independent predictors. Significant ($p<.01$) unidirectional predictors uniquely related to each dimension. Valence was associated with IBI-LF, motivation with PVA-UHF/LF, and activation with PVA-VLF, yielding conditional R^2 values of .66–.82. Combining all top predictors resulted in high predictability (conditional R-squared: valence = .83, motivation = .70, activation = .72).

POSTER SESSION II - 044 | HEMISPHERIC NEUROMODULATION IN THE DLPFC ALTERS ATTENTIONAL SCOPE IN GOAL-DIRECTED STATES: AN RTMS STUDY

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Past research shows that the dorsolateral prefrontal cortex (DLPFC) is asymmetrically related to attentional scope and affect. Greater relative left frontal activity has been linked to heightened approach motivation, which typically narrows attentional scope. In this within-subjects study, repetitive Transcranial Magnetic Stimulation (rTMS) was applied to inhibit neural activity in the left and right DLPFC. Participants completed a modified monetary incentive delay task (MID) before and after stimulation, across two separate sessions. The MID task was designed to induce pre-goal positive, post-goal positive, and neutral states, while attentional scope was assessed using Navon letters. Reaction time results indicate that inhibiting the left (vs right) DLPFC interrupted attentional narrowing in pre-goal positive states as well as attentional broadening in post-goal positive states. The DLPFC appears to be causally involved in emotion-attention interaction between the left and right cortices. Specifically, left DLPFC inhibition appears to disrupt approach-motivated attentional processing in pre-goal and post-goal states. These findings highlight the neural substrates related to goal-directed behavior and their association with approach-motivated attentional processing.

POSTER SESSION II - 045 | MOTIVATIONAL DIRECTION BEYOND AFFECT: FRONTAL ALPHA ASYMMETRY IN APPROACH-AVOIDANCE ACROSS CONTEXTS

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University of Luxembourg

Approach-Avoidance Motivation (AAM) refers to the internal conflict when an individual is driven to both pursue and avoid a goal. Resting-state EEG research links frontal alpha asymmetry to motivational and affective tendencies: greater left frontal activity is associated with approach motivation and positive affect, while right frontal activity is linked to avoidance and negative affect. However, distinguishing motivational direction from affective valence remains challenging. This study introduced an AAM task where cognitive effort, and not emotional load, constitutes the aversiveness of the goal. We hypothesized that higher approach behavior would correlate with greater left frontal activity, higher BAS, and lower BIS scores. 70 participants completed two AAM task versions: one with emotional aversive stimuli, and one involving cognitively demanding tasks for a reward. Resting-state EEG was collected using the MUSE device (channels: TP9, TP10, AF7, AF8). EEG preprocessing included 0.5 Hz high-pass and 100 Hz low-pass filters. AF7 and AF8 were re-referenced to TP9 and TP10. Five minutes of EEG were segmented into 2-second epochs. Frontal alpha asymmetry was calculated as ln(AF8) – ln(AF7). Results showed that higher amount of approached trials were associated with higher BAS and increased left frontal activation in both tasks. However, BIS was negatively associated with approach behavior in the emotional version and positively in the cognitive version. Findings suggest motivational direction, rather than affect, underlies approach-avoidance behavior across contexts.
FUNDING: University of Luxembourg

POSTER SESSION II - 046 | INTRINSIC MOTIVATION AND REWARD PROCESSING VARY BY TASK TYPE: INSIGHTS FROM HIGH-DENSITY EEG

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Intrinsically motivated behaviors are performed for inherent satisfaction and enjoyment. When rewards are contingent on external factors enjoyment is reduced. The neural processes underlying this effect remain unclear. In electroencephalogram (EEG), the reward positivity (RewP) is an event-related potential linked to underlying reward system activity. External gains of reward enhance the RewP, yet RewP may also be related to internal rewards of interest or enjoyment. This study aims to gain insight into the neural correlates of intrinsic motivation. Participants (N = 66) completed a doors task (chance) and stopwatch task (perceived control) while continuous 256-channel high-density EEG was recorded. Feedback was given as a green "win" or red "lose" after each trial in both tasks. Following each task, participants did an engagement questionnaire. A 2x2 ANOVA revealed main effects of task and feedback on RewP amplitude, but no interaction effect. Paired t-tests revealed participants were more engaged in the stopwatch task. There was a relationship between engagement and RewP only for the stopwatch task. These results support the idea that RewP is related to intrinsic motivation, though only in the stopwatch task involving perceived control, as compared to the doors task involving chance. This may suggest that greater perceived control for reward outcomes increases task engagement. Results imply future research should investigate if a certain level of engagement

is needed before variability in RewP can be explained by intrinsic motivational factors.
FUNDING: This study was funded by NSF 2320091

POSTER SESSION II - 047 | FACIAL FEATURES OUTPERFORM CARDIOVASCULAR VARIABLES FOR MOTIVATIONAL DIMENSION PREDICTION

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Virginia Tech

The motivation dimension is often overlooked in traditional emotion research, which emphasizes valence and arousal. This study presents a novel approach to estimate motivational states from either facial or cardiovascular (CV) features, collected in 26 college students (19 female, 7 male), who viewed emotionally evocative film clips. Facial activity was captured through eye-tracking and facial analysis software (OpenFace); CV data were tracked through heart rate variability and pulse volume by photoplethysmography (PPG). Joystick movements were used to validate motivation: i.e., approach and avoidance. Motivation was separately predicted from both facial and CV data using a supervised partial least squared regression. Within-subject slope calibration helped represent the true in-time predictiveness of each modality. Facial features notably predicted motivational states ($r = 0.35$, $r^2 = 0.123$, $p < 0.001$; calibrated $r^2 = 0.320$), surpassing CV data in within-subject accuracy ($r = 0.40$, $r^2 = 0.167$, $p < 0.001$; calibrated $r^2 = 0.249$). Combined models had moderate cross-modal correlation (calibrated $r = 0.28$, $r^2 = 0.08$). Facial data indicate a more sensitive within-subject tracking of motivation, appropriating responses to motivation that autonomic signals might overlook. Moreover, using motivation in combination with the valence and activation dimensions, discrete emotions were predicted (e.g., fear, anger, joy, sadness). These data collectively indicate the importance of inclusion of facial data and the motivation dimension in emotion prediction modeling.

POSTER SESSION II - 048 | CONFIRMATION OF A USEFUL DARK-ROOM RESTING-STATE PROCEDURE: PERIODIC AND APERIODIC MEG ACTIVITY IN CHILDREN

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We showed previously in children 7-12 years old that a resting-state (RS) eyes-open dark room (DR) task provides parietal-occipital RS alpha measures similar to a standard eyes-closed (EC) RS exam. Results provided initial evidence that our RS procedure is feasible for use in participants who cannot remain awake with eyes closed for an extended period, such as infants and young children. The present study extended the DR/EC comparisons to a larger sample with a wider age range and added RS aperiodic measures (power spectrum offset and slope (exponent)) to evaluate 15 distinct brain regions. RS DR and EC MEG activity was recorded in children with typical development (TD; N = 85) and children with autism spectrum disorder (ASD; N = 63) 7.7-17.1 years old. Findings showed good reliability between DR and EC in both TD and ASD for parietal-occipital peak alpha frequency (PAF: frequency with highest alpha power for each participant; intraclass correlation (ICC) between DR/EC conditions = 0.84, $p < .0001$). For the offset and exponent aperiodic measures, combined groups' DR/EC reliability was good in all 15 brain regions, slightly higher for offset (average across the 15 regions = 0.82, $p < .0001$) than exponent (average = 0.71, $p < .0001$). Offset and exponent values varied with age and differed significantly across the 15 brain regions. The similarity in TD/ASD DR/EC periodic and aperiodic ICCs supports the utility of the DR procedure. Regional differences in aperiodic measures demonstrate the need to assess aperiodic activity in brain source space rather than scalp sensor space.
FUNDING: This study was supported in part by NIH grant R01MH107506 (JCE), R21MH098204 (JCE), R21NS090192 (JCE), NICHD grant R01HD093776 (JCE), an Eagles Autism Foundation Pilot Grant (YC), and TALK Supplement Grant GRT-00003651 (YC).

POSTER SESSION II - 049 | DIFFERENT FACE SIZES RESULT IN DIFFERING MODULATIONS OF FACE ERPS

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In everyday life, we encounter people at various distances, causing their faces to vary in size on the retina. Face size is thus an important factor that may modulate face-related processes, yet its impact at the neural level has been studied little and remains unclear. Importantly, face sizes larger than 6° of horizontal visual angle are rarely tested and methodological concerns such as lack of enforced fixation location and small sample sizes are likely contributors to the lack of result consistency. The present study used a gaze-contingent approach where an eye tracker ensured fixation stayed on the nose and investigated the effects of 7 face sizes (2°, 4°, 6°, 8°, 10°, 12°, and 14° horizontally) on gender discrimination. Data were analyzed using data-driven whole scalp mass-univariate statistics. Preliminary results (N = 46) indicate main effects of gender and size, but no interaction between the two. Face size impacted neural activity from 80 to 350ms across the scalp. Paired contrasts showed that the strongest differences around the N170 were seen between 2-4° and 4-6°. Differences between sizes 6-8°, 8-10° and 10-12° were non-significant, while those between sizes 12-14° were seen between 200-250ms only at right posterior sites. Results suggest that face related neural activity is mostly impacted by small and large face sizes but remains similar for faces seen at conversational distances.
FUNDING: Tri-Agency Funding: NSERC

POSTER SESSION II - 050 | ELECTROMAGNETIC SHIELDING REDUCES EFFECTS OF SMARTPHONE-EMITTED RADIATION ON BRAIN ACTIVITY, HEART RATE VARIABILITY, AND ELECTROMYOGRAPHIC ACTIVITY

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German Society for Health Information and Prevention

Research demonstrates effects of electromagnetic field (EMF) exposure on brain activity, heart rate variability (HRV), and cognitive performance. We investigated whether EMF shielding in an electric car (Tesla Model X) reduces effects of EMF exposure on brain activity, HRV, and electromyographic (EMG) activity. Participants were tested either in a control electric car or in an electric car that was prepared with EMF shielding (Gabriel-Tech GmbH, Germany). Measurements were taken in both car conditions under different EMF exposures (engine, air conditioning, navigation device, bluetooth mobile call, WiFi). Spontaneous EEG brain activity was recorded from 256 electrodes before, during, and after each experimental condition. EMF emissions were recorded continuously during all EEG measurements. Participants reported significantly more discomfort (headache, nervousness) with increased EMF emissions. Results showed increased beta and gamma activity in frontal and temporal areas under EMF exposure with most increases in the bluetooth mobile call and WiFi condition in the control electric car compared to the EMF shielded electric car. Further, brain activations involved parts of the limbic system such as hippocampal and hypothalamic areas. HRV (LF/HF ratio) decreased, EMG activity increased with higher EMF emissions. Results indicate that EMFs induce physiological changes that have adverse effects on the psychophysiological state during car driving. Application of EMF shielding in the electric car helps to reduce these effects.

POSTER SESSION II - 051 | ALTERATION OF EARLY ATTENTIONAL PROCESSES BY PAIN DOES NOT AFFECT WORKING MEMORY PERFORMANCE AND CONTRALATERAL DELAYED ACTIVITY DURING A VISUAL COGNITIVE TASK

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Pain is an unpleasant experience that captures attention and promotes protective behaviors. However, attention and working memory (WM) can also inhibit pain to support goal-directed behaviors. This bidirectional interaction may be influenced by task demands and pain intensity, which may favor either protective behaviors or goal-directed behaviors. The influence of these factors may explain the discrepancies observed between studies, but this remains unclear. The present study aims to identify the neurophysiological basis of pain-cognition interactions and their regulation, when task demands and pain intensity are manipulated. Sixty-six healthy individuals completed a Landolt squares task with three levels of task demands (no task, low or high task demands). For 2/3 of the trials, tonic painful electrical stimulation was applied on the leg to produce low or high pain. Cognitive performance and event-related brain potentials reflecting visual attention (N2pc) and working memory (CDA) were recorded and compared between conditions. Task demands ($p < .001$), but not pain ($p = .06$), significantly affected cognitive performance. In addition, the N2pc but not the CDA amplitude was reduced by pain ($p < .01$), and this effect was significantly greater with high compared with low task demands ($p < .05$). These findings suggest that pain disrupts early attentional processes, particularly when task demands are high, while working memory performance and CDA amplitude are unaffected, which may contribute to prioritize cognitive performance and goal-directed behaviors despite pain perception.
FUNDING: NSERC QPRN

POSTER SESSION II - 052 | TEMPORAL SUMMATION OF SECOND PAIN AND C-FIBER-RELATED BRAIN RESPONSES ARE NOT ALTERED DESPITE SECONDARY HYPERALGESIA IN PATIENTS WITH CHRONIC PRIMARY LOW BACK PAIN

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Patients with chronic primary low back pain (CPLBP) show secondary hyperalgesia, which is observed as increased pain sensitivity in tissues surrounding the injury. Secondary hyperalgesia is thought to reflect central sensitization in the spinal cord, which is caused by increased synaptic transmission, particularly for the processing of nociceptive C-fiber inputs. Spinal nociceptive processing cannot be measured directly in humans. However, it can be assessed indirectly with temporal summation protocols, where repeated stimuli result in increased pain perception following the summation of C-fiber-related activity. The processing of C-fiber inputs results in second pain, which is perceived as dull and diffuse pain that follows sharp localized (first) pain. Repeated laser heat stimulation leads to temporal summation of second pain (TSSP), which is thought to result from temporal summation of C-fiber activity in the spinal cord. Therefore, the present study aims to examine whether temporal summation of laser-evoked second pain and the associated C-fiber brain responses are increased in patients with CPLBP compared with age-sex matched controls (n=30 per group; 18 F, 12 M). The results confirmed that patients exhibit secondary hyperalgesia (p0.05). These findings suggest that secondary hyperalgesia and TSSP may rely on different spinal neuronal pools or that secondary hyperalgesia in CPLBP relies on processes not captured with the present protocol.
FUNDING: Natural Science and Engineering Research Council of Canada (grant number: 06559). The Canadian Foundation for Innovation (grant number: 33731) and the Canadian Chiropractic Research Foundation.

POSTER SESSION II - 054 | TRAIT ANXIETY MODULATES VIGILANCE BUT NOT CONFLICT RESOLUTION: SUPPORT FROM MASS UNIVARIATE STATISTICS ACROSS TWO STUDIES

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Conflict detection and resolution are measured by the N2 and P3 components, respectively. The effect of trait anxiety on these neural responses remains debated. Some theories suggest anxiety impairs cognitive control, while others propose it increases attentional vigilance to potential threats. Whether anxiety can impair cognitive control and attentional vigilance to neutral stimuli is unclear. To investigate this, we conducted two well-powered flanker task studies ($N_1 = 74$, $N_2 = 79$) and later combined the data ($N3 = 153$) to improve reliability. Using robust data-driven whole scalp mass univariate statistics, we replicated the typical larger N2 and P3 amplitudes for incongruent (conflict) trials compared to congruent (no-conflict) trials. Importantly, higher trait anxiety was linked to larger amplitudes around 300 ms at left frontal sites (typical N2 timing but different topography) on congruent trials where no conflict was present. Anxiety did not affect the P3 or reaction times. These findings suggest anxious individuals show heightened sensitivity to potential conflict, rather than impaired conflict resolution. An initial finding in Study 1 where anxiety modulated early ERPs in incongruent trials did not replicate in Study 2 nor in the combined dataset, highlighting the importance of large samples and replication in ERP research. Collectively, these results support attentional control theory, which argues that anxiety enhances early vigilance (even to neutral stimuli) without necessarily disrupting later control processes.
FUNDING: NSERC (Natural Sciences and Engineering Research Council of Canada)

POSTER SESSION II - 055 | ATTITUDES TOWARDS EMOTIONS ARE ASSOCIATED WITH RESTING FRONTAL ASYMMETRY: INFLUENCE OF MOTIVATIONAL STATES AND MOTIVATIONAL CONFLICT

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Attitudes towards emotions are subjective evaluations of emotion. Attitudes to emotion are linked to behaviors and traits but their neural correlates remain unexamined. Resting frontal asymmetry reflects trait motivation and may relate to attitudes towards emotions. Greater relative left frontal asymmetry (LFA) relates to approach motivation. Greater relative right frontal asymmetry (RFA) relates to avoidant motivation and motivational conflict. In the current EEG study, 204 participants completed the Attitudes Towards Emotions scale (rating attitudes towards Joy, Anger, Sadness, Fear, and Disgust), followed by an 8-minute resting EEG recording. A difference score of right (F2, F4) minus left (F1, F3) frontal electrodes were created. Results showed that positive attitudes towards positive approach emotions were associated with greater relative LFA, whereas positive attitudes towards negative withdrawal emotions were associated with greater relative RFA. Trait approach motivation and impulsivity moderated the relationship between positive attitudes towards negative withdrawal emotions, such that higher trait approach and impulsivity predicted greater LFA. These results suggest that greater RFA is associated with positive attitudes towards negative withdrawal emotions reflects motivational conflict. At the trait level, it appears that heightened approach motivation and impulsivity decrease motivational conflict resulting from positive attitudes towards negative withdrawal emotions. These results reveal that neural substrates of motivation may drive attitudes towards emotion.

POSTER SESSION II - 056 | INTEROCEPTIVE AWARENESS AND PUNISHMENT SENSITIVITY ENHANCE ERROR EVALUATION

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Recent studies have proposed that both error-related negativity (ERN) and error positivity (Pe) are modulated by individual differences in both punishment/reward sensitivity and interoceptive awareness, interacting with the significance of error. To examine these relationships, we investigated correlations among ERN/Pe and individual differences in the behavioral inhibition system (BIS), behavioral approach system (BAS), and interoceptive awareness. Twenty-nine participants performed a spatial Stroop task in 3 conditions (4 blocks of 72 trials) as well as a heartbeat counting task (HCT). Each error response was penalized by 10 yen in the punishment condition, every four accumulated correct responses was rewarded by 10 yen in the reward condition and no loss or reward in the neutral condition. In HCT, they were instructed to count and report the number of their own heartbeat during three trials (25 s, 35 s, and 45 s). HCT scores were calculated as 1 minus the absolute value of recorded heartbeats minus counted heartbeats, all divided by recorded heartbeats. Individuals with higher interoceptive awareness exhibited larger ΔPe amplitudes (punishment minus neutral condition) ($r = .46$, $p = .01$). Furthermore, individuals with higher BIS scores showed smaller ΔPe amplitudes (reward minus neutral condition) ($r = -.48$, $p = .01$). Monetary punishment may enhance error evaluation in individuals with higher interoceptive awareness. These results further support the notion that Pe may be modulated by both punishment/reward sensitivity and interoceptive awareness.
FUNDING: JSPS KAKENHI Grant Numbers 25K03012 from the Japan Society for the Promotion of Science

POSTER SESSION II - 057 | INVESTIGATING RELATIONSHIPS BETWEEN SELF-REPORTED SYMPTOMS AND NEUROPHYSIOLOGICAL INDICES FOLLOWING MILD TRAUMATIC BRAIN INJURY

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University at Buffalo

Mild Traumatic Brain Injuries (mTBI) can cause disturbances in brain functioning and cognitive difficulties. While mTBI patients will often self-report symptom impact to the clinician, there are limited well-validated tools for measuring objective neural disturbances resulting from mTBI in the clinical setting. Electroencephalography (EEG) recordings can provide an objective measurement of disturbances in brain functioning. The aim of this feasibility study was to investigate how the severity of self-reported post-concussion symptoms relate to objective measures of brain functioning in individuals with a recent mTBI. All participants completed a subjective Post-Concussion Symptom Scale (PCSS) and a computerized Go/NoGo task while dense EEG recordings were obtained. Event-Related Potentials (ERPs) were derived from the EEG recording. Correlational analyses were conducted to identify significant relationships between the self-reported post-concussion symptoms and ERP components. The analyses indicated that patients that reported greater cognitive symptom severity tended to have more pronounced central N2 amplitude for No-Go trials and earlier central P3 latency for Go trials. These results suggest that mTBI patients that had more severe cognitive symptoms may have needed additional neural resources to accurately perform a response inhibition task. These findings provide preliminary evidence that ERP measures obtained for a Go/NoGo task can provide objective neural indices of injury impact that align well with the subjective experience of the patient.
FUNDING: This research was supported by a grant from the American Society for Laser Medicine and Surgery (ASLMS).

POSTER SESSION II - 059 | IS EMPATHY A MULTIDIMENSIONAL CONSTRUCT? NO SUPPORT FROM ERPS TO PAINFUL STIMULI

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Empathy is a multidimensional construct that is often studied using pain-eliciting stimuli. ERP studies claim that different empathy constructs modulate the ERP time course to painful stimuli differently, but most studies use only one task and thus tap into only one construct. We used a within-subjects ERP design in which participants observed images of body parts experiencing painful and neutral stimulation, followed by faces portraying the reaction of the person experiencing the stimulation (painful/neutral). Participants (N = 100) responded to these stimuli under four different task conditions: they rated how much discomfort they felt (Affective Sharing), how much concern they had for the person experiencing the pain (Empathic Concern), how much pain they thought the person was in (Perspective-Taking), or how masculine or feminine the face looked (control). Data-driven mass univariate analysis of all time points and electrodes were performed on the epoch, time-locked to the body part stimuli. In contrast to previous claims, affective sharing did not modulate early ERP components. Instead, pain-neutral amplitude differences started around 200ms and were widespread across the scalp for all tasks except the control task (which did not show any modulation), with no difference across empathy tasks. We therefore suggest empathic constructs cannot be dissociated during the early stages of neural processing. Implications for theories of empathy, emotion and social cognition will be discussed.
FUNDING: Natural Sciences and Engineering Research Council of Canada (NSERC)

POSTER SESSION II - 060 | THE UNPLEASURABLE DISREGARD OF EFFORT: ANHEDONIA IS RELATED TO REDUCED CONSIDERATION OF COSTS DURING REWARD VALUATION

Gavin Heindorf, Harold Rocha, John Shuford, Brenda Guajardo, Ashlee Ross, Sanjili Seenath, Molly Schmitt, Peter Clayson
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Reduced valuation of rewards and worse effort-cost decision making are hallmarks of anhedonia. Anticipatory and consummatory subdomains of anhedonia have been identified, how each one is related to valuation of rewards that are contingent upon effort exertion has not been determined. We tested the relationships between both subdomains of anhedonia and reward valuation, while considering the role of effort. 78 participants completed the effort-doors task while continuous EEG was collected. The consummatory (Cons) and anticipatory (Ant) subscales of the temporal experiences of pleasure scale (TEPS) were used to measure anhedonia. Reward valuation was measured using reward positivity (RewP). TEPS-Ant scores were not related to RewP. In the low effort condition, lower TEPS-Cons scores were associated with a smaller RewP to gains and a larger RewP to losses. In the high effort condition, lower TEPS-Cons scores were associated with larger RewP to gains, while RewP following losses was similar across TEPS-Cons scores. Only following low effort exertion was greater consummatory anhedonia associated with reduced valuation of rewards. At low levels of consummatory anhedonia the cost of exerting high levels of effort reduced reward valuation and increased the valuation of losses, while at high levels of consummatory anhedonia the opposite was true. The relationship between anhedonia and reward valuation is not unidirectional; rather, it seems that consummatory anhedonia is related to an inability to adaptively incorporate effort-cost decision making into reward and loss valuation.

POSTER SESSION II - 061 | EFFECTS OF CANNABIS USE AND BINGE DRINKING ON GOSTOP P3 AMPLITUDE

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Studies on the effects of binge drinking and cannabis misuse on executive functioning have been inconsistent. The current study examined behavioral and ERP performance during an inhibitory control task in young adults characterized by either binge drinking or social drinking and either regular cannabis use (at least 3 to 4 times per week) or no cannabis use. A pilot sample (N=22) of binge drinking cannabis users (n=5), binge drinking non-cannabis users (n=5), social drinking cannabis users (n=6),

and social drinking non-cannabis users (controls; n=6) completed a GoStop task that involved the presentation of 5 digits in black print on a white screen. Participants responded when the number matched the previous number (NoStop trials). Stop trials, in which the number changed from black to red, indicated the participant should withhold their response. Repeated measures analysis of P3 amplitude at midline electrodes indicated a significant effect of stimulus type [F(3,102)=5.18,p=.003] such that P3 amplitudes were smaller to NoStop trials relative to novel numbers (first number in a pair). A main effect for group approached significance [F(3,17)=2.79,p=.07]. Post-hocs indicated the social drinking cannabis users exhibited larger P3 amplitudes relative to controls regardless of stimulus type. Analyses indicated no group effects on behavioral performance. These findings parallel research demonstrating greater neurocognitive resource allocation to maintain performance in cannabis users, but do not support expected detrimental effects of binge drinking on inhibitory control.
FUNDING: This study was funded by the RIT College of Liberal Arts Faculty Education and Development Fund.

POSTER SESSION II - 063 | THREAT-RELATED ATTENTIONAL ABERRATIONS AMONG SUICIDE ATTEMPTERS: EVIDENCE FROM THE LPP AND TARGET-LOCKED P300

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Some theories of suicide posit that suicidal behaviors are partly promoted by suicide capability. Research points to blunted neurobehavioral responses to threat among suicide attempters, including a reduced late positive potential (LPP) when passively viewing or down-regulating attention to threat/mutilation images. However, no research has tested whether attempters better regulate attention to goal-directed non-emotional targets in the context of distracting threat/mutilation images, which may better reflect processes underlying suicidal behavior. Participants (n =103) completed an emotional interrupt task, viewing distracting, task-irrelevant negative, positive, and neutral IAPS images while responding to shapes on-screen. Images appeared for 1000ms before target onset and reappeared after target offset. LPPs were scored as average activity 400-1000ms post-picture onset at Pz. Target-locked P300 amplitudes were scored as average activity 300-600ms post-target onset at Pz. Unstandardized residualized difference scores were generated for Δthreat/mutilation and Δpositive LPP and P300. Suicide attempters showed reduced Δthreat/mutilation LPP (β = -0.24, p = .03) and increased target P300 (β=0.41, p = .0001) during threat/mutilation trials. Attempt history was unrelated to Δpositive LPP and P300 (p's > .62). Findings replicate prior results of blunted LPP during threat/mutilation image presentation among attempters and expand this work by showing that attempters were better able to regulate attention toward goal-directed behavior in the context of threat/mutilation stimuli.

POSTER SESSION II - 064 | INVESTIGATING THE LINK BETWEEN COGNITION AND CARDIAC ACTIVITY IN INTERNALIZING DISORDERS

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Elevated heart rate (HR) and reduced heart rate variability (HRV) at rest have been linked to emotion regulation difficulties and symptoms of depression and anxiety. Resting cardiac activity is thus considered a promising transdiagnostic marker for internalizing disorders. However, studies on HR and HRV in transdiagnostic samples, particularly during cognitive effort, remain limited. This study investigated changes in HR and HRV between rest and cognitive effort in patients with internalizing disorders. Additionally, we examined HR and HRV relations to transdiagnostic symptom dimensions. A total of 300 patients with a current diagnosis of obsessive-compulsive disorder, anxiety disorders, or a depressive disorder, along with 60 control participants without psychiatric disorders underwent a four-minute resting condition followed by a gambling task while ECG was continuously recorded. Moreover, symptom questionnaires were administered. We hypothesized that patients would show lower resting HRV and higher HR compared to controls, and higher levels of anhedonia, anxiety, depression, and compulsivity to be linked with reduced HRV. We exploratively examined associations between cognitive processes and HR/HRV. Results suggest both condition (rest vs. cognitive effort) and group effects on HRV, but not on HR. Potential associations between HRV and cognitive effort will be discussed with a focus on transdiagnostic aspects. As a transdiagnostic marker, HRV may reflect cognitive alterations in psychiatric disorders, with implications for diagnostics and targeted interventions.
FUNDING: Funded by Deutsche Forschungsgemeinschaft – FOR5187 (project number 442075332).

POSTER SESSION II - 065 | TRAIT WORRY IS PREDICTIVE OF SUBJECTIVE BUT NOT AUTONOMIC MEASURES OF EMOTION DYNAMICS

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Towson University

Measuring emotion dynamics (ED) has become increasingly important for understanding psychopathology, yet few studies have systematically compared subjective and autonomic measures of emotion. Within the ED literature, worry—a form of repetitive negative thinking linked to anxiety and mood disorders—remains understudied. Further, emotion variability (EV) has emerged as a particularly informative ED metric, with strong links to psychological well-being. In this study, 118 undergraduates completed a measure of trait worry before viewing eight emotionally valenced videos (e.g., positive, negative, and neutral), during which continuous emotion intensity was recorded via electrodermal activity and a manual rating dial. EV was operationalized as the standard deviation of these continuous signals. After controlling for mean emotional responding,

trait worry significantly predicted subjective, but not autonomic, emotion variability. Furthermore, concordance between autonomic and subjective ED, evaluated using multiple metrics, showed little shared variance. These findings contribute to evidence of weak coherence across emotion indicators and have implications for selecting measures in psychopathology research.

POSTER SESSION II - 066 | DECISION-MAKING IN INTERNALIZING DISORDERS: TRANSDIAGNOSTIC DIFFERENCES IN THE DRIFT DIFFUSION MODEL

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Across internalizing diagnoses, impairments in cognitive processes such as decision making have been related to symptoms and symptom development. A better understanding of the cognitive impairments can enhance our comprehension of the underlying psychopathological mechanisms and facilitate the development of targeted interventions. Therefore, we aim to fill this gap by fitting a drift diffusion model (DDM) to behavioural data from patients and control groups performing a flanker task. Drift rates model the evidence accumulation speed to form a decision, previous work indicates a difference between OCD patients and the control group. Applying those findings to a large transdiagnostic sample (n = 523 in total, patients with Obsessive-compulsive disorder n = 40, Social phobia n = 42, Specific phobia n = 41, Panic disorder n = 31, Generalised anxiety disorder n = 33, Agoraphobia n =37, other diagnosis n = 31, no diagnosis n = 268), we hypothesized to find differences in the drift rates, and boundary separation between patients and controls for internalizing disorders. Furthermore, we will explore differences between the different diagnostic groups. Initial analysis showed significant higher absolute drift rates for patients in comparison to the control group. Analyses regarding the link to performance monitoring related ERPs are pending. Further analysis considering relevant variables like specific diagnosis or psychological symptom ratings are ongoing and will shine light on altered decision processes in internalizing psychopathology.
FUNDING: Data collection: DFG-Grant RI-2853/2-1, current study DFG-Grant-RI-2853/7-1 / Supported by Deutsche Forschungsgemeinschaft – RU5389

POSTER SESSION II - 067 | THE ROLE OF REWARD MAGNITUDE IN UNDERSTANDING THE CLINICAL PHENOTYPE OF ADHD

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Attention-deficit/hyperactivity disorder (ADHD) is defined by difficulty sustaining attention and inhibiting impulsive behavior. ADHD symptoms are thought to be driven by abnormal sensitivity to rewards, with a complex pattern: hyposensitivity to rewards in some contexts and hypersensitivity in others. These differences may be explained in part by the role of reward magnitude. To test this, we used a monetary incentive delay task that featured a manipulation of reward magnitude. On different trials, participants had the chance to win a large reward ($1), a small reward ($.20), or to break even. EEG data were collected from a non-clinical sample of young adults (N=49). ADHD symptoms were measured using the ADHD Self-Report Scale, and personality traits related to impulsivity were measured using the UPPS-P. Within-subjects analyses showed that reward magnitude modulated ERP amplitudes across multiple stages: Cue-P3, Contingent Negative Variation, Reward Positivity (RewP), and Feedback-P3 (p's<.05). Between subjects, ADHD symptom severity correlated with impulsigenic traits of sensation seeking and positive urgency (r's>.30, p's<.05). Greater ADHD symptom severity was also associated with reduced RewP amplitude (win minus loss), and this association was specific to small rewards (r=-.321, p=.026) and not large rewards (r=.071, p=.631). This symptom-ERP association was not explained by trait impulsivity. This overall pattern is consistent with a model whereby abnormal reward sensitivity in ADHD is context-specific and driven in part by reward salience.

POSTER SESSION II - 068 | DIFFERENCES IN HIGH-FREQUENCY CONNECTIVITY AMONG LARGE-SCALE FUNCTIONAL NETWORKS LINKED TO MAJOR DEPRESSIVE DISORDER AND TREATMENT-RESISTANT DEPRESSION

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Altered neural connectivity between the default mode (DMN), frontoparietal (FPN), and salience networks (SN) has been described in both major depressive disorder (MDD) and treatment-resistant depression (TRD). However, the specificity of these changes to MDD and/or TRD is unclear, as is their nature (i.e., hyper- vs. hypoconnectivity). Thus, the present study used 96-channel resting state EEG data collected from 34 participants with MDD (22 women, aged 29.9 ± 9.6 years), 24 participants with TRD (16 women; aged 44.4 ± 15.9 years), and 34 healthy control (HC) participants (25 women, aged 32.5 ± 14.1 years) to evaluate group-level differences in high-frequency between- and within-network resting state functional connectivity (rsFC) estimated using exact low-resolution electromagnetic tomography. Our analyses found that relative to controls, participants with depression (i.e., pooled MDD and TRD participants) had diminished within-DMN beta1 (12.5–18 Hz) connectivity. Moreover, when directly contrasting participants with MDD and TRD, TRD participants showed increased within-DMN, DMN-FPN, and FPN-SN beta3 (21.5–30 Hz) connectivity; these differences persisted when controlling for depression severity. Results suggest that differences in beta-frequency rsFC among the DMN, FPN, and SN may partially account for neural mechanisms of TRD. Future research is needed to further probe these changes with respect to the heterogeneity (i.e., age of onset, symptom profile, episode count) and time-course (i.e., length and frequency of episodes) of experiencing depression.

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POSTER SESSION II - 069 | DO ANXIETY TRAITS MODULATE FACIAL EXPRESSION PROCESSING? A FULL-SCALP MASS UNIVARIATE ERP STUDY

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Individuals with general and social anxiety are more sensitive to negative facial expressions (e.g., fear and anger) than those who are not anxious. At the neural level, however, modulations of face-related ERPs by anxiety remain inconclusive, potentially due to small sample sizes ($N < 80$) and error-prone statistics. The present study combined two datasets for a large sample ($N = 114$, Goal $N = 160$) and used robust full-scalp mass univariate analyses. Participants viewed neutral, happy, angry, and fearful faces, and rated faces on valence and arousal. We measured social anxiety using the SPIN scale and general anxiety using the STICSA-trait scale. Preliminary results revealed that those with higher general and social anxiety traits rated angry and fearful expressions as more negative than those with low anxiety. Full scalp regressions revealed small influences of anxiety on ERP amplitudes. Social anxiety predicted ERP amplitudes for happy expressions (lateral frontal N2), whereas general anxiety predicted amplitudes for happy (central N1), angry (parietal P1) and fearful (central N1) faces. These results suggest that general anxiety, and to a lesser extent social anxiety, alters attention to affective faces, but not traditional face-related mechanisms (e.g., N170, EPN). They also do not completely align with behavioral ratings, suggesting a brain-behaviour disconnect. This study provides insights into the neural underpinnings of anxiety traits' influence on facial expression processing in the general population.
FUNDING: Natural Science Research and Engineering Research Councill of Canada (NSERC)

POSTER SESSION II - 070 | DISTRACTION UNDER COMPETITION IN OBSESSIVE-COMPULSIVE DISORDER

Katherine McCain, Estelle Ayomen, Arash Mirifar, Caroline Love, Carol Mathews, Andreas Keil
University of Florida

The present study investigated the extent that attentional resources are allocated to salient emotional visual information under competition in individuals with obsessive-compulsive disorder (OCD, $N = 40$) and healthy participants (HC, $N = 40$). Previous research has found that patients with OCD exhibit deficits in attentional processes, including reduced awareness to emotionally relevant information. However, other studies suggest that individuals with OCD exhibit increased electrocortical activation in response to unpleasant or aversive visual information, consistent with hypervigilance. The present study addressed these opposing findings by quantifying competition for limited capacity attentional resources. Our paradigm included a foreground task where participants detected direction changes in a random dot kinematogram (RDK) overlayed on naturalistic distractors (pleasant, neutral, unpleasant, and OCD symptom-specific images). Amplitude envelopes of steady-state visual evoked potentials (ssVEPs) in response to the RDKs served as the dependent variable. Data were also fit to the distraction under competition model (DUC), a computational framework of selective attention. Our results indicated that the task-evoked ssVEP envelopes in both groups were drastically attenuated upon presentation of the distractors—more so for emotional, compared to neutral pictures. Group differences also emerged with stronger distraction effects for the OCD group, driven to a large extent by the unpleasant but not the symptom-related pictures.
FUNDING: This research is supported by the National Institutes of Mental Health grant R01MH135426.

POSTER SESSION II - 071 | NEURAL RESPONSES TO INTERPERSONAL EMOTIONAL STIMULI MODERATE EFFECTS OF SOCIAL CONTEXT ON REAL WORLD AFFECTIVE RESPONSES

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Close relationships are integral to adolescent mental health. However, some adolescents get a greater affective benefit from spending time with close others, potentially due to differences in neural responsiveness to social situations. We used ecological momentary assessment (EMA) to examine how time with family and friends impacts positive (PA) and negative affect (NA) and whether the late positive potential (LPP), an ERP indexing neural arousal to salient stimuli, to positive and negative interpersonal images moderated associations between social context and affect. Adolescents ages 14 to 17 (n=105) viewed positive and negative interpersonal images with neutral comparisons while the LPP was measured. EMA was used to assess affect and who they were with 7 times per day for a week (Mcompleted=31.31, SD=9.02). Multilevel models showed that spending time with family was associated with higher PA (b=0.10, p.27). Results suggest that LPP reactivity to negative social stimuli may moderate individual differences in adolescent emotional responses to spending time with family.
FUNDING: Brain and Behavior Research Foundation Katherine Deschner Family Young Investigator Grant and Klingenstein Third Generation Foundation Fellowship to Autumn Kujawa. NIMH T32-MH18921 supported Samantha Pegg and Christian Bean. Sam Pegg was also supported by

POSTER SESSION II - 072 | REWARD PROCESSING AND ANGER IN YOUTH WITH TOURETTE SYNDROME

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McGill University

Children with Tourette Syndrome (TS) often experience explosive outbursts–intense, uncontrollable anger reactions triggered by minor events–which are among the most challenging symptoms for youth with TS and their families. However, the brain activation patterns associated with these outbursts remains poorly understood. Research on ADHD, which commonly co-occurs in TS, has linked enhanced irritability with increased reward-related electrophysiological activity. This study examined whether electrophysiological measures of reward processing were associated with feelings of anger in youth with TS. Twenty-nine typically developing children (TDC) and 38 children with TS (aged 10-14) completed the Doors task while EEG was recorded. The reward positivity (RewP), delta, and theta oscillations were extracted from feedback-locked data. Anger reactions were assessed with the Children's Inventory of Anger (ChIA), a self-report measure of anger feelings in hypothetical situations. Children with TS scored higher on ChIA than TDC. Greater delta responses were significantly associated with higher ChIA scores. There was also a significant interaction between group and ChIA total scores, such that the association with delta was only significant for children with TS. RewP and theta were not significantly related to ChIA, though effects were in the same direction. These findings suggest that increased reward-related delta is associated with enhanced feelings of anger in youth with TS. This provides preliminary evidence that the reward system functioning may contribute to explosive outbursts.

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POSTER SESSION II - 073 | CHANGES IN REWARD PROCESSING THROUGHOUT A TASK PREDICT WORTHLESSNESS ONE YEAR LATER

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Texas A&M University

Changes in how individuals respond to repeated rewards and/or loss could provide insight into prospective risk for depression that is not evident in mean levels of reward responding. Here, one-hundred and sixty-eight individuals with mixed internalizing psychopathology reported symptoms and performed a monetary gambling task with EEG at baseline and one year later. Exploratory factor analysis was used to identify transdiagnostic symptom dimensions of worthlessness and anhedonia. Participants with greater reductions in the RewP to wins across the task had greater increases in worthlessness one year later ($b = 1.7$, $p = .027$). In addition, greater reductions in the RewP to losses across the task were associated (cross-sectionally) with increased worthlessness and anhedonia in both years (bs $> .07$, ps $< .02$). Therefore, failure to sustain responsivity to reward across a task—potentially reflecting reduced expectations regarding positive outcomes—appears to proceed and may play a role in the development of worthlessness one year later. Nonetheless, trial-level changes in reward responding may catalyze but not characterize worthlessness once it has emerged, as this metric showed no cross-sectional associations. Changes in response to loss appear to be a persistent, but relatively non-specific correlate of current depressive psychopathology. Overall, results indicate that dynamic alterations in loss and reward processing (above and beyond mean levels) may increase understanding of risk for and mechanism underlying transdiagnostic depressive constructs.

FUNDING: This work was supported by National Institute of Mental Health award R01 MH125083 (to AM)

POSTER SESSION II - 074 | INDIVIDUAL DIFFERENCES IN GENERALIZING FEAR EXTINCTION LEARNING ACROSS THE SPECTRUM OF ANXIETY LOAD: INTEGRATING VERBAL REPORTS, STARTLE RESPONSES, AND SKIN CONDUCTANCE

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This study investigated individual differences in fear extinction generalization to novel cues or contexts across the spectrum of anxiety load. Participants included low ($n = 27$), moderate ($n = 30$), and high trait-anxious individuals ($n = 21$), and anxiety-disordered patients ($n = 26$). Two paradigms tested extinction generalization to cues and contexts, respectively. Both involved instructed fear acquisition, extinction (24 h later), and generalization testing. Outcomes included US expectancy ratings, skin conductance responses (SCR), and fear-potentiated startle (FPS). In the cue paradigm, main effects of stimulus emerged for US exp. and FPS, ps $< .001$, indicating fear discrimination and generalization gradients. No group differences were found. SCRs showed no stimulus effect, but a trend-level group effect, $p = .076$, with descriptively higher responses in low-anxious individuals. In the context paradigm, US exp. showed a cue × group interaction, $p = .001$. Only the medium-anxious failed to differentiate CS+ from CS– in the extinction context, all others retained discrimination, ps $< .011$. Generalization gradients were observed in all groups, ps $< .005$, though weakest in medium-anxious. Group effects were non-significant in SCR; only the acquisition context showed CS+ > CS–, $p = .016$. In FPS, the CS+ > CS– difference emerged across all contexts, ps $< .01$, except one; group effects were not significant. Results suggest that medium trait-anxious individuals may exhibit slightly enhanced context-related generalization, indicating a non-linear association with trait anxiety.

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POSTER SESSION II - 075 | EMOTION-ATTENTION RELATIONSHIPS IN ANXIETY: A MULTIMODAL NETWORK ANALYSIS

Kyle O'Brien, Jinu Mathew, Bridget Kennedy, Priscillia Ihionkhan, Kyla Kiser, Isabella Ferrara, Premananda Indic, Sarah Sass
The University of Texas at Tyler

Anxiety affects how attention, emotion, and behavior interact, yet these systems are often studied in isolation. Psychological network analysis is an emerging statistical approach that models psychological variables as interconnected nodes, with edges representing the strength of relationships between them. This method allows researchers to examine how the structure of emotional and attentional interactions differs between individuals with anxiety and healthy controls. This study integrated psychophysiological event-related potential (ERP) data, behavioral performance, and self-report measures into a unified network model. Sixty-two participants were categorized into an anxious group with elevated worry but minimal depressive symptoms (n= 31), and a low-symptom control group (n= 31). Participants completed the Emotion Attention Blink (EAB) task, while EEG recorded brain responses to happy and angry emotional distractors. Behavioral performance and self-reported positive and negative emotional traits were also collected. Separate psychological networks were constructed for each group using zero-order and partial correlation methods. Results showed that anxious individuals displayed more densely connected networks, lower modularity, and stronger partial associations between brain responses and emotional distress traits compared to controls. Findings align with emerging network models of psychopathology, supporting the view that anxiety reflects systemic changes in how emotion and attention dynamically interact.

POSTER SESSION II - 076 | EMOTIONAL INFLEXIBILITY AND REACTIVITY AS RISK FACTORS FOR FEAR-RELATED SYMPTOMATOLOGY: A COMBINED EMA AND FMRI STUDY

Ha Jeong Park, Annmarie MacNamara
Texas A&M University

Affective inertia, the tendency for one's affective state to persist, may play a role in the maintenance and worsening of internalizing symptoms. In addition, heightened amygdala activation may predict worsening psychopathology. Combining measures of daily affect and fMRI BOLD may yield new insight that is not possible using one measure alone. Here, we examined whether positive and/or negative affect (PA and NA) inertia would moderate the prospective association between amygdala activation and internalizing symptoms one year later. In Year 1, a mixed internalizing sample (n = 76) completed a passive picture-viewing task during fMRI, followed by 10 days of ecological momentary assessment (EMA) of daily affect. Self-reported internalizing symptoms were assessed at Year 1 and Year 2, yielding three underlying components: Distress, Fear, and OCD. PA/NA inertia were estimated using multilevel modeling of EMA, and amygdala activation was extracted for Positive > Neutral and Negative > Neutral pictures. Amygdala activation, affective inertia, and their interaction were entered as predictors of Year 2 internalizing dimensions, separately for PA/NA. Heightened amygdala activation and higher PA/NA inertia in Year 1 predicted greater increases in Year 2 Fear symptoms (NA X amygdala, $\beta = .254$, $p = .006$; PA X amygdala, $\beta = .190$, $p = .018$; main effect of amygdala, $\beta s > .173$, $ps < .03$); no effects for other symptom dimensions. As such, emotional inflexibility, paired with stronger neural reactivity to emotional stimuli, may be a risk factor for developing worse fear-related symptoms.
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POSTER SESSION II - 077 | MOTIVATIONAL BIASES FEEDBACK BASED LEARNING UNALTERED OBSESSIVE COMPULSIVE DISORDER

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Humans tend toward action execution in the promise of reward and action suppression when anticipating punishment. However, whether these motivational biases reflect biased action selection or biased learning and outcome processing is still debated. Reward-related striatal dopamine has been suggested as the neural origin for these biases, which may thus be reflected in the feedback-related negativity (FRN). Obsessive-compulsive disorder (OCD) is characterized by dysregulated fronto-striatal circuits with deficits in action control and goal-directed behavior. However, no previous studies tested whether motivational biases are altered in OCD. The present study compared OCD patients (n=28) with healthy controls (HCs; n=27) and patients with social anxiety (SAD; n=29) who completed an active and observational variant of an orthogonalized go/nogo task. Behavioral results revealed a robust motivational bias both in active and observational learning, but no differences between groups. In active and observational learning, the FRN was biased by cue valence, with more negative amplitudes for unfavorable versus favorable feedback in win conditions but the reverse pattern for avoid-losing conditions, again with no significant group differences. Interestingly, OCD patients showed generally larger P3 amplitudes compared to HCs, and reduced P3 valence coding relative to SAD in observational learning only. Unaltered motivational biases and FRN amplitudes in OCD therefore challenge views assuming striatal origin for these biases, although OCD may show differences in self-other monitoring.
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POSTER SESSION II - 078 | A DATA-DRIVEN MAP OF HRV INDICES: CLUSTERING TO INFORM SELECTION

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Heart rate variability (HRV) can be quantified using numerous mathematical indices, but the lack of systematic, empirical

comparisons complicates their selection and interpretation. This study evaluated the reliability, consistency, and generalizability of structural relationships among 89 HRV indices using a consensus-clustering approach. We analyzed 635 short-term resting-state ECG recordings from two samples of college students with differing psychological profiles. In a sample with elevated internalizing symptoms (N=233), data collected across two sessions one week apart were used to assess test-retest reliability of HRV clusters. To evaluate generalizability beyond this group, we compared results to a second sample not selected based on psychological symptoms (N=203). We identified 19 clusters of 70 HRV indices with cross-method, test-retest, and cross-sample robustness. Based on these findings and index popularity in the literature, we recommend 13 HRV indices for short-term resting-state recordings: RMSSD, SDNN, RSA (Porges-Bohrer or Peak-to-Trough method), RSA (Gates method), SD1/SD2 or CSI, ApEn or SampEn, HF or LnHF, DFA alpha1, DFA alpha2, selected MDFA alpha1 and alpha2 features, heart rate asymmetry indices, and heart rate fragmentation indices. Our results offer a practical framework for selecting HRV indices, reducing bias from redundant measures, and strengthening the validity of conclusions drawn from HRV analyses.
FUNDING: This work was supported by an Australian Government Research Training Program (RTP) Scholarship awarded to Tam Pham.

POSTER SESSION II - 079 | NEURAL CORRELATES OF WORKING MEMORY SUBPROCESSES IN CHILDREN WITH AND WITHOUT ADHD

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Working memory impairments are common in ADHD but most clinical studies do not consider within-group heterogeneity. Further, clinical studies often rely on neuropsychological assessments not aligned with modern cognitive theory, limiting understanding of mechanisms and potential for intervention. The current study utilized a well-characterized sample of school-aged children (n = 227, nADHD = 101) to examine differences in working memory performance and its neural correlates during a change detection task that aligns with controlled attention theories of working memory. Time-frequency analysis and cluster-based permutation tests investigated group differences in event-related synchronization and desynchronization (ERS/ERD) associated with alertness, encoding, and maintenance. Additional analyses addressed within-group heterogeneity by comparing Low and High Capacity ADHD groups. Children with ADHD had worse accuracy and higher reaction time variability (RTSD) compared to TD children, particularly on high load trials (Group*Load $p = .026$). Accuracy differences were driven by Low Capacity ADHD children, whereas elevated RTSD characterized both ADHD subgroups. The High Capacity ADHD group showed distinct beta and gamma ERD clusters during alerting, encoding, and maintenance compared to TD children (all $p < .025$), potentially related to neural preparation for change. Results support controlled attention models of working memory impairment in ADHD and suggest even ADHD children with normative performance may achieve it in different ways than their typically-developing peers.
FUNDING: R01MH120109

POSTER SESSION II - 080 | APERIODIC AND PERIODIC COMPONENTS OF EEG POWER SPECTRA VARY BY TIME OF DAY

Eoin Quinn, Aatrey Bidkar, Brian A. Metzger
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A central pursuit of clinical neuroscience has been the identification of biomarkers for neuropsychological disorders. Following Donoghue et al. (2020), the field has seen renewed interest in using aperiodic and periodic spectral features of EEG to investigate the neural underpinnings of behavior and cognition. Lendner et al. (2020) showed that 1/f slope varies as a function of arousal, potentially confounding previously identified associations between 1/f slope, behavior, cognition and mood. More recently, researchers have identified aperiodic spectral features (1/f slope and offset) as novel biomarkers, especially for treatment-resistant forms of depression (e.g., Hacker et al. 2024; Xiao et al. 2023). The present study assesses time of day as a potential confound. Preliminary analyses of frontal resting state EEG data in 47 participants suggest that aperiodic slope, but not aperiodic offset or alpha power, is correlated with time of day, at least at frontal electrodes. We intend to run mediator and moderator analyses to better understand the nature of the association between 1/f, alpha power and mood. By analyzing data from 64 electrodes (standard 10-10 system), we will construct a more global picture of the relationship between periodic and aperiodic spectral features, time of day, and mood. These data not only serve to further our understanding of the neural underpinnings of mood, but may also elucidate the degree of mutual information carried by periodic alpha and aperiodic 1/f signals.

POSTER SESSION II - 081 | HOW ARE AUTONOMIC PHYSIOLOGY AND EMOTIONAL BEHAVIOR LINKED IN FUNCTIONAL SEIZURES?

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Arizona State University

Functional (non-epileptic) seizures (FS) appear similar to epilepsy but are a neuropsychiatric disorder where seizure-like behaviors occur without any EEG-based seizure activity. Misrepresentation of body sensations and lack of emotion coherence is one hypothesized FS mechanism. We examined links between autonomic reactivity and observable behavior during a relived emotions task in 11 FS patients and trauma controls high (n=25) or low (n=24) in posttraumatic stress disorder (PTSD) symptoms. Specifically, we examined the association between cardiac interbeat interval (IBI) and respiratory sinus arrhythmia (RSA) reactivity scores (change from pre-task baseline) while participants were thinking about, describing out loud, and resting after reliving emotional memories (happy, anger, shame) and positive and negative behaviors (composites of specific emotions) coded from videorecordings. We hypothesized

that these associations would be weaker for FS versus controls. Given the small sample, we examined correlations and exploratory moderation analyses. For the shame condition, there was a significant interaction (moderation) effect (p=.017), whereby for controls with PTSD symptoms, IBI decreases (suggesting faster heart rate) were related to more negative emotional behavior (p=.061)--but the inverse was true for FS, with IBI increases (suggesting slower HR) associated with more negative emotional behavior (p=.095). These preliminary pilot findings suggest that behavior-physiology associations may not be weaker, but rather differently patterned, among those with functional seizures.

POSTER SESSION II - 083 | EFFECTS OF EMOTIONAL SPEECH CONTEXT ON THE NEURAL PROCESSING OF CONTINUOUS SPEECH

Teagan Esther, Liron Shlesinger, Fernando Llanos
The University of Texas at Austin

High-arousal emotional speech is characterized by changes in signal amplitude that significantly alter the temporal structure of speech signals. This EEG study investigated how these changes influence the neural tracking of amplitude modulation patterns critical for speech intelligibility, alpha oscillations related to emotional states, and how these biomarkers are affected by stimulus presentation (blocked by emotion or randomized across emotions). EEGs were collected from 30 adult native speakers of American English while they listened to repetitions of semantically neutral sentences under two between-subject conditions. In the blocked condition, stimuli were presented across three blocks of angry, happy, and neutral speech. In the randomized condition, stimuli were fully randomized across emotions. Participants performed a word recognition task to ensure comparable attention levels throughout the session. Changes in amplitude modulation were more robustly tracked in neutral speech compared to happy and angry speech across conditions. In the blocked condition, angry speech was associated with lower alpha power over occipital channels, suggesting a greater state of vigilance. In the randomized condition, angry speech was associated with greater alpha power over central channels, suggesting increased inhibitory allocation in response to rapid rises in stimulus arousal. Altogether, these findings suggest a dissociation between the neural encoding of temporal speech patterns and the internal emotional states evoked thereby.

POSTER SESSION II - 085 | INNER RHYTHMS OF THE BODILY SELF: CARDIORESPIRATORY CONTRIBUTIONS TO SENSE OF AGENCY AND VOLUNTARY ACTION INITIATION

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Sense of agency (SoA), the experience of controlling voluntary actions and their effects, has been linked to specific sensorimotor processes within the nervous system. Recent frameworks propose that inner bodily rhythms, like cardiac and respiratory signals, contribute to action generation and self-attribution, with SoA arising from integration of interoceptive and sensorimotor processes. While voluntary actions tend to align with specific cardio-respiratory phases, whether such phase biases modulate SoA remains unclear. In this preregistered study (osf.io/z7g9h), 44 healthy adults (28.7 +/- 7.24years; 23F) completed an intentional binding task alongside cardiac and respiratory recordings. Action and tone binding measures were computed to conduct circular and binary cardio-respiratory analyses. Behaviorally, we replicated classic intentional binding effects: voluntary actions were perceived later and tones earlier when these occurred together, compared to alone. Cardiac analysis showed a trend toward initiating keypresses early in the cardiac cycle, with participants favoring systole over diastole for action generation. Cardiac phase at action or tone onset had no direct effect on action or tone binding, respectively. However, exploratory results suggested that those participants for whom a greater proportion of tones happened to occur during systole – a phase of high interoceptive noise – also showed weaker tone binding. Ongoing respiratory analyses will further clarify how inner bodily rhythms shape voluntary action initiation and SoA.
FUNDING: MGe was supported by the Graduate School Scholarship Programme (GSSP) of the Deutscher Akademischer Austauschdienst (DAAD), in the context of the Berlin School of Mind and Brain graduate programme (Faculty of Philosophy, Humboldt-Universität zu Berlin, Berlin).

POSTER SESSION II - 086 | ACTIVE TOUCH EXPLORATION OF MATERIALS: AN FNIRS INVESTIGATION OF AESTHETICS

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Of all sensory modalities, the sense of touch stands out as the only active sense and haptic processing may go in hand with hedonic evaluation ("Does it feel good?"). In a previous study, we used fNIRS and found that left frontal activity is linked to subjective pleasure ratings when actively exploring materials (woods, textiles) using the right hand. Here, we aim to extend our findings by using a broader range of materials and collecting ratings about their sensory properties (roughness, bumpiness) in addition to aesthetic judgements. 38 participants to actively explore 54 different material samples taken from nine materials (ceramic, glass, leather, metal, paper, plastic, stone, textiles, wood) while brain activity was registered using fNIRS (51-channels). Linear mixed-modelling of the ratings revealed that smoother and more even surfaces were judged as more pleasant and, when controlled for these sensory features, paper and leather were judged as the most pleasant materials, while stone and metal were perceived as least pleasant. As expected, contra-lateral sensory-motor activity was evoked by active touch. The individual, trial specific ratings were used as a parametric modulator. This revealed that frontal brain activity tended to be related to the perceived hedonic value of the stimuli.

POSTER SESSION II - 087 | INDIVIDUAL DIFFERENCES IN FACE PERCEPTION

Tringa Lecaj, Stefania Conte
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The face inversion effect (FIE) is often considered a marker of expert face processing, as inverted faces are more difficult to recognize than upright ones. Neural responses, typically explored via analyses of event related potentials (ERPs), can provide information of cognitive processes as they occur. Yet, there is limited evidence on the relationship between behavioral and neural measures in contributing to the variability in the FIE. The Autism Quotient (AQ) scale, which quantifies autistic traits in heathy controls, has been shown to predict face viewing behavior, suggesting the importance of considering AQ traits when investigating individual variability in face perception. In the current study, we investigated whether the face inversion effect of face-sensitive ERPs (i.e., P1 and N170) can predict face perception performance. Fifty-six college students completed the Oxford Face Matching Task (OFMT), the AQ questionnaire, and an ERP task while viewing upright and inverted faces and houses. Preliminary analysis showed that high performers (based on a median split of OFMT scores) were about 10% more accurate than low performers ($M = 80$) on behavioral indices of face perception ($p < 0.001$). The P100 amplitude showed a significant stimulus X orientation interaction ($F(1,45) = 15.78$, $p < .001$), with larger responses for inverted faces than both upright faces and inverted houses. The N170 ERP showed larger negativity and faster responses for faces than houses. Further analyses will focus on brain behavior links to better understand individual differences in face perception.

POSTER SESSION II - 088 | EVALUATING THE ROBUSTNESS OF THE FACE FIXATION LOCATION EFFECT ACROSS DATASETS AND STATISTICAL METHODS

Calla Mueller, Roxane Itier
University of Waterloo

Recent studies using event-related potentials and gaze-contingent procedures have found modulations in early visual processing (~80-350ms, maximal at ~130ms) when participants fixate on different features of a face, such as the mouth, nose, or eyes. We evaluated the robustness of these neural modulations by face fixation location across three large distinct datasets (N1=51, N2=52, N3=54) and three different statistical techniques—mass univariate statistics (MUS), partial least squares analysis (PLS), and microstate segmentation analysis. Results were very consistent across datasets, and three main patterns emerged. The first pattern was primarily driven by differences between the mouth and other features around 120ms after face-onset, reflecting retinotopic mapping at the parietal C2 component. The second pattern reflected differential processing between the nose and the other fixations around the N170 timing. The last pattern reflected differences between the right and left eye throughout but maximally around the P1. Maximal effects typically fell between, rather than on, component peaks, regardless of statistical method. All three statistical methods showed similar results. However, while MUS and PLS plots highlighted the same results and complemented each other, segmentation plots were not as readily interpretable or uniquely useful. These findings highlight the importance of robust statistics and careful consideration of how ERP results are interpreted and reported, and demonstrate the strength and reliability of the face fixation location effect.
FUNDING: NSERC

POSTER SESSION II - 089 | LET'S TALK ABOUT SEX... DIFFERENCES IN ALCOHOL'S PHARMACOLOGICAL EFFECTS ON STARTLE POTENTIATION: A MULTIVERSE APPROACH

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Alcohol stress response dampening (SRD) motivates alcohol use and increases risk for addiction. Prior research using startle potentiation (SP) in cued threat tasks suggests alcohol SRD is greater for uncertain stressors but individual differences in these effects are rarely assessed. Novel animal models suggest alcohol SRD may vary by sex due to neurobiological differences, but this has not been confirmed in humans. Following recent interest in sex difference, the present study investigates whether alcohol SRD differs between males and females using a large dataset of archival data ($N = 563$). This large sample combines several alcohol pharmacological manipulation studies that varied stressor certainty, allowing rigorous investigation of the interaction between sex, stressor certainty and alcohol SRD effects. Initial analyses showed alcohol SRD was greater for uncertain stressors replicating previous studies. Males exhibited greater overall startle potentiation but sex did not interact with stressor type or with alcohol's effects on stressor certainty. To evaluate the robustness of these findings across varied analytic choices, we applied a multiverse analysis. Our findings were largely consistent across the majority of dozens of universes that varied in their quantification of SP. These findings highlight the robustness of alcohol's selective SRD effects under uncertainty and suggest limited evidence for sex differences. This work informs ongoing debates about sex-specific alcohol vulnerability and emphasizes the importance of transparency in psychophysiological research.

POSTER SESSION II - 090 | MENSTRUAL CYCLE INFLUENCES NEURAL AND BEHAVIORAL MECHANISMS OF FACIAL EXPRESSION PROCESSING

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This study investigated sex differences in facial emotion processing using event-related potentials (ERPs), focusing on how menstrual cycle influence neural and behavioral responses. Participants (18-45yr; 25 males, 25 follicular-phase females, 25 luteal-phase females) completed an emotion recognition task during a 64-channel electroencephalographic recording.

Assessed ERPs included the face-sensitive N170 (P7-P07; P8-PO8), VPP (Fz), early visual (P2 at Pz; N1/N2 at F3-F4), and emotion-sensitive ERPs (EPN at P7-P8; early/late LPP at POz). Luteal-phase females responded faster than both follicular-phase females and males. Females exhibited faster N170 and EPN latencies in the right vs. left hemisphere while this was not observed in males. Specifically, EPN latency for the follicular group was significantly faster than for males. Both VPP amplitude and eLPP area-under-the curve were reduced for scrambled faces compared to emotional expression in luteal-phase females, with a similar pattern in males for VPP. In contrast, follicular-phase females exhibited higher EPN amplitudes to scrambled faces than emotional faces. Additionally, EPN latency to fearful faces was longer in males than females in the follicular group. This study tests a broad range of ERPs, shedding light on how hormonal fluctuations shape sex differences in emotional processing. These preliminary results will be complemented by ongoing analyses on hormonal data which will provide deeper insight into sex- and menstrual-cycle-related variability in emotional processing.

FUNDING: The Natural Sciences and Engineering Research Council of Canada (NSERC); The University of Ottawa's Brain and Mind Research Institute (uOBMRI) (Mental Health Trainee Researcher Award)

POSTER SESSION II - 091 | HORMONAL MODULATION OF BRAIN DYNAMICS IN MENSTRUATING ADOLESCENTS AND YOUNG ADULTS: EEG INSIGHTS ACROSS THE MENSTRUAL CYCLE

Gabriela Kennedy, Megan Baran-Goldwax, Rosalie Pomerleau, Emmanuelle Coutu-Nadeau, Inga Sophia Knoth, Sarah Lippé
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Symptomatology in neurodevelopmental conditions (NDCs) presents profound sex differences. Individuals assigned female at birth (AFAB) show more sensory sensitivity (SS) and internalizing problems (ex: anxiety). The physiological mechanisms of these differences are underexplored. SS is affected by sex-specific hormonal fluctuations and stress hormones. We explored the effects of fluctuating estrogen and cortisol during the menstrual cycle on sensory brain dynamics in youth AFAB. Using electroencephalographic recording during resting state and auditory steady state 40Hz stimulation, brain activity was recorded on Day 1 and 10 of the menstrual cycle in a pilot sample (n=15, 30% with NDC) of menstruators aged 18-30 (M=23.93, SD=4.06). Cortisol, estradiol, and estrone levels were extracted from saliva samples using Liquid Chromatography-Tandem Mass Spectrometry. Estradiol and estrone were significantly increased between Day 1 and 10. Resting state brain dynamics and sensory brain responses were significantly different between Day 1 and 10. We observed higher gamma power on Day 1 during early menstruation (low gamma: $t(14) = 2.1$, $p = .027$; high gamma: $t(14) = 1.9$, $p = .037$). Day 1 increase in gamma was further associated with elevated cortisol levels. Higher estrone variations from Day 1 to 10 (increase) predict higher differences in synchronizations in auditory neural entrainment (40Hz ITC). Sex and stress-related hormonal changes across the menstrual cycle may shape resting state and sensory brain dynamics in individuals AFAB. Whether they relate to SS warrants investigation.

POSTER SESSION II - 093 | LPP-RESPONSES TO EROTIC STIMULI: INFLUENCE OF GENDER AND MENSTRUAL CYCLE

Katharina Paul[1], Aisha Munk[2], André Beauducel[3], Johannes Hewig[4], Andrea Hildebrandt[5], Corinna Kührt[6], Erik Müller[7], Farina Mund[1], Roman Osinsky[8], Anja Riesel[1], Christoph Scheffel[6], Cassie Short[5], Jutta Stahl[9], Alexander Strobel[6], Johannes Rodrigues[4], Jürgen Hennig[2], Jan Wacker[1]
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This study investigates gender differences in neural responses to erotic stimuli using the Late Positive Potential (LPP), an established EEG measure of emotional and motivational processing. Utilizing an extensive dataset from the multi-site CoScience EEG-Personality Project ($N = 741$), we examined the neural reactivity during a response matching task involving visual stimuli. Consistent with prior research, erotic images reliably elicited greater LPP amplitudes compared to non-erotic images, thus validating their motivational significance and salience. More notably, within this heterosexual sample men demonstrated significantly heightened LPP responses than women when viewing opposite-sex erotic images. Conversely, women exhibited somewhat larger LPP amplitudes to same-sex erotic images, consistent with theories suggesting greater sexual fluidity among women. These patterns were also reflected in subjective ratings, with women rating same-sex images as more positive and arousing than men. Modest effects of menstrual cycle phases on women's neural responses to erotic versus non-erotic images did not match expectations and were only observed in additional exploratory analyses. Furthermore, supplementary cooperative forking path analysis provided rich information on the robustness of these results. Overall, these results highlight the complexity of gender and hormonal influences on sexual responses, emphasizing the importance of large-scale studies for capturing subtle individual differences.

POSTER SESSION II - 094 | BEHAVIOURAL AND NEURAL DYNAMICS OF CATEGORY LEARNING ACROSS THE MENSTRUAL CYCLE

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University of Toronto

A growing body of literature demonstrates widespread effects of ovarian hormones on the brain. However, resulting impacts on human cognition remain to be fully elucidated. Here we provide a multimodal account of cognition across the menstrual cycle using category learning – a core cognitive process that requires careful coordination of learning, memory and attention – as a tool for capturing complex cognition. Using a newly developed

method, we find that category learning varies across the menstrual cycle in a non-linear fashion that parallels the typical rise and fall of ovarian hormone estradiol across the cycle (N=171): accuracy increases steadily across the early follicular phase, peaks in the late follicular phase, and decreases again over the mid-late luteal phase. We replicate this behavioural effect in a follow-up MRI study (N = 42) and confirm that activation in brain regions supporting concept formation similarly varies across the menstrual cycle. Finally, we take the analysis a step further by examining hormone-gene interactions in participants tested at two points in the menstrual cycle using the same cognitive task (N=64). Results demonstrate that BDNF genotype, which affects neuroplasticity, modulates participants' sensitivity to estradiol fluctuations across the menstrual cycle as reflected in cognitive performance. Our results combine behavioural, imaging and genetic data to provide a comprehensive neurobiological account of learning and memory across the menstrual cycle.
FUNDING: This research is supported by Natural Sciences and Engineering Research Council (NSERC) Discovery Grants to MLM (RGPIN- 2017-06753, RGPIN-2024-0588), Canada Foundation for Innovation and Ontario Research Fund (36601) to MLM, Brain Canada Future Leaders in Canadian Brain Research Grant to MLM.

POSTER SESSION II - 095 | RESTING EEG ALPHA AND THETA POWER AS BIOMARKERS OF INSOMNIA AND PAIN FOLLOWING TRAUMATIC INJURY

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Pain following traumatic injury is a major concern, due to its interference with everyday functioning, such as sleep. Prior work has implicated waking spectral EEG as a biomarker associated with both pain and sleep disturbance. Here we assessed the spectral features of pain and insomnia specifically following traumatic injury hospitalization. Thirty-four participants who were hospitalized for traumatic injury (n=34) completed self-report assessments of pain and insomnia and resting-state EEG at a 7-day follow-up. Alpha (8-13Hz) and theta (4-7Hz) power during 3-minutes of eyes closed were calculated using the Fast-Fourier transformation. Associations between EEG variables and pain and sleep measures, including the ISI (Insomnia Severity Index), PCS (Pain Catastrophizing Scale), PVAQ (Pain Vigilance and Awareness Questionnaire), and BPI (Brief Pain Inventory), were analyzed via bivariate correlations. Elevated alpha at the central electrodes and widespread theta were significantly associated with higher ISI ($r=.37$, $p<.05$; $r=.39$, $p<.05$). Greater alpha was associated with greater pain interference, primarily at central electrodes ($r=.39$, $p<.05$). Theta power was associated with higher PCS scores, strongest at central electrodes ($r=.45$, $p<.05$). No consistent associations were observed between EEG and pain intensity or PVAQ. These findings support the potential of alpha and theta as biomarkers of risk for persistent pain and insomnia following trauma, and that region-specific patterns suggest different neural mechanisms underlie various dimensions of pain-related dysfunction.
FUNDING: Wellcome Leap Grant

POSTER SESSION II - 096 | RESTING VAGALLY-MEDIATED HEART RATE VARIABILITY (VMHRV) AND SUBJECTIVE SELF-REPORTED VARIABLES IN ATHLETES: A SCOPING REVIEW

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Purpose: This review investigates the relationship between vagally-mediated heart rate variability (vmHRV) and self-reported subjective variables (SV) in athletic populations, evaluating methods used to measure these markers. It aims to provide evidence-based recommendations for optimizing athlete monitoring and guiding future research. Method: A systematic search of Web of Science, PubMed, and Sport Discus, following the PRISMA-ScR framework, identified 8,086 records (February 2024). Studies involving non-athletic or clinical populations, animal models, reviews, non-peer-reviewed, and non-English articles were excluded. A total of 28 peer-reviewed studies examining vmHRV and SV in athletic contexts were included. Methodological quality and consistency were evaluated using the JBI tool and Cohen's Kappa. Results: SV were grouped into fatigue-recovery indicators, psychological states, and sleep-related variables. Higher vmHRV was often positively linked to better recovery and sleep and negatively associated with fatigue and stress, though substantial heterogeneity existed across studies. Conclusion: The relationship between vmHRV and SV is complex and context-sensitive, influenced by factors such as training load and psychological stress. Personalized interpretations are essential for combining physiological and psychological perspectives. Guidelines for improving data collection, standardization, and interpretation are provided to enhance future research and practice.

POSTER SESSION II - 097 | THE INFLUENCE OF BREATHING-INDUCED ACTIVATION ON THE PRE-DECISIONAL INFORMATION SEARCH AND STRATEGY SELECTION

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Psychophysiological activation is known to influence cognitive performance, but the exact form of this influence is still not fully understood. Arousal-biased competition (ABC) theory predicts that high activation biases the information search by enhancing the processing of the most relevant or salient attributes. Paced breathing represents a unique technique used to manipulate the activation level. In the current study, we tested the hypothesis that the pre-decisional information search and strategy selection become more heuristic, non-compensatory under high breathing-induced activation. In a within-subject design, 70 participants completed a multi-attribute decision task in low- and high-activation conditions, induced through slow-and fast-paced breathing. The assessment of psychophysiological activation via electrocardiography, electrodermal activity, and

self-report data supported the effectiveness of the manipulation. The results showed that under high activation participants acquired a similar amount of information in a significantly shorter time ($p = .029$, $d = 0.24$) and used non-compensatory strategies more often ($p = .024$, $d = 0.34$) than under low activation. These results partly align with the premise of ABC theory, reflecting enhanced processing of the most relevant cue under high activation in the strategy selection but not in a more selective search. Future studies should consider the potential of paced breathing as an accessible activation-regulation technique and further explore the role of activation in efficient information processing.
FUNDING: NSERC

POSTER SESSION II - 098 | EFFECTS OF 2-WEEK TRANSCUTANEOUS VAGUS NERVE STIMULATION ON STRESS, ANXIETY, AND CARDIAC VAGAL MODULATION: EVIDENCE FROM A RANDOMIZED PLACEBO-CONTROLLED TRIAL IN NON-CLINICAL ADULTS

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GE Transcutaneous vagus nerve stimulation (tVNS) is a promising therapeutic technique targeting the vagus nerve, a key component in regulating stress and emotions. We investigated the impact of a 2-week tVNS intervention on perceived stress, anxiety, and heart rate variability (HRV), a potential biomarker for tVNS efficacy, in a non-clinical population. In a randomized, placebo-controlled, waitlist trial, 76 adults (aged 18-75yrs) were divided into four groups: Early active/sham tVNS and Late active/sham tVNS. The Early groups underwent the intervention immediately after the baseline visit, while the Late groups started two weeks later. Both active and sham tVNS were administered daily for two weeks, with 4-hour sessions targeting the tragus (active) or earlobe (sham). Stress and anxiety were assessed using the PSS10 and GAD7 at baseline, after 2 and 4weeks. Resting HRV was collected in the supine position. Results indicated that 2weeks of active tVNS significantly reduced perceived stress and anxiety in both the Early and Late groups, with lasting effects observed in the Early active tVNS group during follow-up. Active tVNS was more effective than sham in reducing perceived stress ($p=0.009$) and anxiety ($p=0.014$) in the Early group, but not in the Late group. No significant changes in resting HRV were observed. Findings suggest that tVNS may effectively reduce perceived stress and anxiety and could be a useful tool for managing psychological distress in non-clinical populations. However, resting HRV does not appear to be a reliable biomarker for left ear-baesd tVNS efficacy.
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POSTER SESSION II - 099 | THE ROLE OF PARENTS' MINDSETS IN HOW THEIR ADOLESCENT RESPONDS TO A SOCIAL STRESSOR

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Parents concerned by their teen's mental health may inadvertently encourage stress avoidance. Yet, stress is not all bad. Teens can learn to optimize their physiological stress responses (SR) to engage in valuable but demanding opportunities. SR can be a threat (prolonged, debilitating) or a challenge type (short, fostering adaptability) based on one's appraisals of acute stressful events and their SR as harmful or helpful. Stress mindsets shape these appraisals in specific stressors: believing stress is harmful leads to threat SR and avoidance, while embracing stress fosters challenge SR, growth, and improves outcomes. This study adapted a stress optimization intervention to empower parents to guide teens through stressful moments. Parents ($M_{age} = 46.2$, $SD = 5.8$, 86% Mother, 80% White) of 77 dyads randomly completed the intervention (or a control condition), aiming at shifting their stress mindsets to optimize their own and teen's SR ($M_{age} = 14.8$, $SD = 1.3$, 56% Girl) during a lab speech task in front of evaluators. Parents prepared their teens before they observed them giving the speech. We recorded continuous cardiac reactivity to assess SRs. Parents assigned to the intervention group exhibited more challenge-type SR (higher CO) when preparing their teen, indicating that the intervention helped them provide support. Moreover, parents in both conditions helped optimize their teens' SR (increase in CO from preparation to speech). Follow-up analyses will focus on sources of heterogeneity, such as prior mindsets, and language displays that successfully support children.
FUNDING: Canadian Institutes of Health Research

POSTER SESSION II - 100 | VALIDATING WRIST-BASED CONSUMER DEVICES AGAINST STATIONARY LAB EQUIPMENT FOR RESEARCH ON THE AUTONOMIC NERVOUS SYSTEM

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Do wearable consumer devices provide a cost-effective and more naturalistic alternative for research on the autonomic nervous system? We compare interbeat interval (IBI) data collected via two consumer devices (Wavelet, Empatica E4) relying on plethysmographs (PPG) and via electrocardiograph (ECG) using stationary BIOPAC equipment. 107 participants completed a baseline, speech task, and math task from the Trier Social Stress Test while wearing consumer devices and connected to BIOPAC equipment. Data point counts revealed that the consumer devices recorded fewer data points (~37.6%) than the lab device. Data missingness for the consumer devices was also greater during the speech and math tasks than during the baseline recording, suggesting a decrease in reliability during stress states. We inferred that the trademarked data cleaning algorithms used by the consumer devices were pre-emptively deleting datapoints that we may have retained through manual post-processing. Values of the post-processed data were also not equivalent

between devices. IBIs recorded with the consumer devices were longer (ME4 = 697.0, SD = 118.3; MWavelet = 682.5, SD = 108.1) than IBIs recorded with the lab equipment (MLab = 675.0, SD = 110.3). Differences were exacerbated in physiological measures that rely on difference calculations between successive IBIs, like measures of heart rate variability. We discuss how the trademarked data cleaning algorithms of many consumer devices are "black boxes" that may pose barriers related to reliability and validity for psychophysiological researchers.
FUNDING: Social Sciences and Humanities Research Council of Canada (SSHRC)

POSTER SESSION II - 101 | STRESS IN AN EYEBLINK: EFFECTS OF STRESS INDUCTION ON BLINK PARAMETERS AND BLINK RELATED POTENTIALS

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Leibniz Institute - IfADo

Human eyeblinks represent a time-locking event that can be used to study brain processing during natural behavior in the absence of triggered experimental stimulation. Indeed, blink related brain activity has been successfully employed to infer cognitive load. Whether blink related potentials may also reflect stress levels is unknown. Here, we investigated if stress alters blink related potentials and blink parameters. In two sessions, participants (N=50) underwent both a stress and a control protocol. The stress protocol consisted of three Cold Pressor Tests (CPT) of three minute duration interspersed with 15 minute task blocks. In the control protocol, a warm water bath was employed instead of the CPT. Stress levels were monitored by measurements of cortisol and subjective ratings of stress. EOG and EEG were recorded and analyzed time-locked to eye-blinks to quantify blink activity and blink related potentials. Successful stress induction was confirmed by increases in cortisol and ratings of stress during stress vs control. Importantly, we found that stress decreased blink velocity and enhanced the occipital N1 of the blink related potential, while the P3 and late frontal negativity were reduced. These results are in line with enhanced bottom-up excitability under stress, previously reported with visual evoked potentials. Our findings thus demonstrate that effects of stress are reflected in eyeblinks and blink related brain activity, offering great potential for the measurement of stress during natural behavior.

POSTER SESSION II - 103 | IS VAGAL ACTIVITY A SHIELD AGAINST THE EFFECTS OF STRESS ON DECISION MAKING? THE INTERACTION BETWEEN HEART RATE VARIABILITY AND CORTISOL IN THE IOWA GAME TASK

Valentin Magnon, Félix Duplessis-Marcotte, Roxanne Leblanc, Florence Beaudin, Evelyne Deschamps-Venne, Marie-France Marin
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From simple choices to life-changing decisions, decision-making is a crucial cognitive ability in our everyday lives. In stressful situations, participants tend to make impulsive and risky decisions that may result in more costs than benefits. The effects of stress on decision-making can be explained by biomarkers such as cortisol levels. In contrast, heart rate variability indexing vagal activity (HRV) has been associated with self-regulation and stress management. Recent evidence shows that HRV, is associated with advantageous decision making, especially when the decision-making task involves some level of risk and uncertainty. Therefore, higher HRV may promote self-regulatory mechanisms that benefit decision-making only in stressful contexts. The aim of the present study was to investigate the potential interaction between HRV and cortisol levels (high in the stress condition vs. low in the control condition) in decision making among healthy adults (n = 79, data collection in progress). Preliminary results show a positive association between HRV and advantageous decision making measured by the Iowa Gambling Task only in the stressful condition (high salivary cortisol reactivity, $p < .05$). These results suggest that HRV may be a beneficial factor only in stressful situations when cortisol reactivity is high and when self-regulatory mechanisms are required. This finding highlights the relevance of HRV-based interventions, such as paced breathing to improve vagal activity, in stressful decision-making situations to promote beneficial decision-making.
FUNDING: FONDS DE RECHERCHE DU QUÉBEC Sector :HEALTH

POSTER SESSION II - 104 | EXPLORING LINKS BETWEEN VAGAL REACTIVITY TO STRESS, PACED BREATHING AND LONG-TERM MEMORY PERFORMANCE

Maria Meier[1], Christian J. Merz[2], Tobias Rüttgens[2], Oliver T. Wolf[2], Elea Klink[1], Raphaela Gärtner[1], Bernadette Denk[1], Stella Wienhold[1], Nina Volkmer[1], Jens C. Pruessner[1]
[1]University of Konstanz, [2]Ruhr University Bochum

The parasympathetic nervous system is integral for adaptation and implicated in self-regulation. Whether high vagal reactivity has beneficial cognitive effects in situations that demand self-regulation remains unclear. Here, we explored if vagal reactivity to stress and paced breathing is linked to long-term memory of the stressful episode. Thirty adults (age = 23.13, SD = 2.9; 60 % female) participated in a two-day study. On day one, they underwent the Trier Social Stress Test with objects and encoded a word list. On day two, they memorised the objects (central, peripheral) and words (neutral, negative, positive) and performed paced breathing. An electrocardiogram was obtained to compute the root mean square of successive differences (RMSSD) as vagally-mediated heart rate variability marker and to explore links between RMSSD reactivity, recovery and long-term memory. We found that higher RMSSD stress reactivity was linked to remembering fewer central objects and positive words. Moreover, higher RMSSD stress recovery was associated with recalling more positive words. Additionally, higher reactivity to paced breathing was associated with remembering fewer neutral words, while stress reactivity was not linked to the reactivity to paced breathing. While high stress reactivity was associated

with memory impairments, a fast stress recovery seemed to buffer negative effects on positive word recall. These findings highlight the involvement of vagal reactivity in long-term memory of stressful episodes and may contribute to a better understanding of self-regulatory processes.

POSTER SESSION II - 105 | TOWARDS MULTIMODAL MANIPULATION CHECKS: PHYSIOLOGICAL AND SELF-REPORTED RESPONSES TO THE CYBERBALL TASK

Nina Micanovic, Vera Vine
Queen's University

Cyberball is an ostracism task where participants believe they are playing a ball-tossing game with other participants but are then excluded (Williams et al., 2000). Manipulation checks typically rely on self-report (e.g., of believability), but subjective experience commonly does not align with other response domains (Brown et al., 2020). Cardiac parasympathetic activity (e.g., RSA) can be a sensitive indicator of responses to rejection (Balzarotti et al., 2017). We examined Cyberball's validity using RSA reactivity and its associations with rejection-relevant states and traits, plus self-reported believability. Participants (n = 15, expected final N = 25) completed questionnaires on rejection-relevant traits (e.g., rejection sensitivity, social connectedness, discrimination experiences). They then completed a Cyberball task with 2-minute Inclusion and Exclusion conditions and reported on task believability and experience. We assessed respiratory sinus arrhythmia (RSA, as HF-HRV) during the task. Self-reported believability varied widely and was relatively low (M=4.50, SD=2.56, range:1-9). Nevertheless, RSA reactivity (Inclusion Minute 2 - Exclusion Minute 1) showed a tendency toward withdrawal (M=-0.40, SD=0.69). More RSA withdrawal was correlated with all trait and state rejection-related constructs (|r|s from .40 to .74), consistent with rejection-related reactivity response. This study highlights the importance of multimodal psychometric investigation of common behavioral tasks and suggests limitations of over-reliance on subjective reports in assessing task validity.
FUNDING: Queen's University Equity, Diversity, Inclusion and Indigenization (EDI-I) Fund

POSTER SESSION II - 106 | HRV METRICS DURING SLOW-PACED YOGIC BREATHING TRACK PARASYMPATHETIC, NOT SYMPATHETIC, INFLUENCES AS VERIFIED WITH PHARMACOLOGICAL BLOCKADES

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Heart-rate variability (HRV) is widely used to gauge autonomic influences, yet interpreting low-frequency power during slow breathing is contentious because both parasympathetic and sympathetic influences may operate. Published pharmacological data from our laboratory showed that low-frequency HRV power is abolished by vagal blockade but unchanged by sympathetic blockade. Therefore, in this report we assessed whether widely used time-domain HRV metrics, specifically RMSSD, pNN50, and SDNN, also exhibit predominantly or exclusively vagally mediated changes during slow-paced breathing under sympathetic and parasympathetic pharmacological blockade. Data were from six healthy adults who performed eleven 1-min paced-breathing trials (4.0–9.0 bpm) on three double-blind days receiving saline, esmolol, or glycopyrrolate. Metrics derived from these IBI series were assessed with linear mixed-effects models. All metrics showed a robust drug effect (p.05). Thus, time domain metrics of HRV – even at low breathing rates – are of vagal origin. In conjunction with the prior report on these data using spectral power the time - and frequency-domain indices converge to suggest that in quiet laboratory conditions, these metrics reflect parasympathetic influences even at slow breathing rates.

POSTER SESSION III - 001 | GREATER AMYGDALA REPRESENTATIONAL PATTERN SIMILARITY BETWEEN NEUTRAL FACES THAT FOLLOW NEGATIVE IMAGES PREDICTS WORSE CORRUGATOR FACIAL EMG MEASURES OF RECOVERY FROM NEGATIVE IMAGES

Kareem Al-Khalil, Jonathan Morris, Mingtong Liu, Sarah Skinner, Lauren Gresham, Stacey Schaefer
University of Wisconsin-Madison

We examined associations between functional magnetic resonance imaging (fMRI) measures of amygdala and facial electromyography (EMG) measures of negative emotional responses in a large sample from the Midlife in the U.S. (MIDUS) study's 3rd follow-up: n=130, mean age = 65.56 years (SD=9.36), age range = 47-95 years, 58% Female, 24% BIPOC. During fMRI, participants viewed a series of negative, neutral, and positive images for 4 s each, with each image followed 2 s later by a neutral face presented for 500 ms. Amygdala representational pattern similarity between the negative images and the neutral faces following them assessed amygdala recovery. Outside the scanner, participants viewed a matched but different set of negative, neutral, and positive images, again presented for 4 s each. Participants' facial responses were measured continuously with EMG of the corrugator supercilii muscle, with the 8 s after offset of the negative images assessing corrugator recovery. Those participants who exhibited greater bilateral amygdala pattern similarity between negative images and neutral faces that followed them, suggesting greater persistent amygdala negative responding and poorer recovery, also exhibited flatter slopes after negative picture offset in their corrugator EMG, B=.04, SE = 0.01, $\beta = .23$, $t(127) = 2.62$, $p = .010$, even after adjusting for sociodemographics. These results support important connections between individual differences in negative emotional recovery processes measured with facial EMG and in the amygdala with fMRI.
FUNDING: The MIDUS Neuroscience Project has been supported by the National Institute on Aging (P01-AG020166, U19-AG051426, U01-AG077928) and by a core grant to the UW-Madison Waisman Center from the National Institute of Child Health and Human Development (P50HD10

POSTER SESSION III - 002 | NOT JUST ANYONE: THE RELATIONSHIP BETWEEN LIVING SITUATION AND COGNITIVE AGEING IS MEDIATED BY SYSTOLIC BLOOD PRESSURE AND DEPRESSION

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Socially isolated individuals are at a greater risk of cognitive decline. In this study, we examined whether the presence of social relationships in living situations buffer against cognitive ageing and whether the type of social relationships matter. We evaluated 10,545 cognitively normal (CN, mean age = 71.6) and 9,334 individuals with mild cognitive impairment (MCI, mean age = 72.9) from the National Alzheimer's Coordinating Center. Participants' living situation was classified as living alone, with spouse/partner or with a relative/friend. Cognitive function and depression were assessed by a neuropsychological battery and the Geriatric Depression Scale respectively. In CN individuals, living with a partner/spouse was associated with higher cognitive performance compared to all other living situations, while living with a relative/friend was associated with the worst cognitive performance. This difference was most evident in females. MCI individuals living with a relative/friend also had lower cognitive performance even when compared to individuals living alone. In addition, higher systolic blood pressure and depressive symptoms mediated these effects, suggesting that the type of social relationship affected stress pathways. Our findings suggest that living situation and social dynamics matter in cognitive ageing. Compared to living alone, living with a partner/spouse may provide cognitive resilience via social support but living with a relative/friend may contribute to poorer cognitive performance due to higher stress and depressive symptoms.
FUNDING: This work was supported by the Social Science Research Council (Singapore) and administered by the Ministry of Education, Singapore), under its Social Science and Humanities Research (SSHR) Fellowship (SSRC2023-SSHR-003).

POSTER SESSION III - 003 | ISOMETRIC PELVIC MUSCLE CONTRACTION ENHANCES HEART RATE VARIABILITY IN PHASE-DEPENDENT FASHION DURING 0.1 HZ BREATHING

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Background: The heart rate variability boosting effect of slow-paced 0.1 Hz breathing (SPB) can be enhanced via inspiratory isometric pelvic muscle contraction. Although promising, the precise phase-dependencies of such respiratory-musculoskeletal entrainment effects on HRV remain to be established. Purpose: Therefore, this preregistered study (osf.io/yrz5n) expanded prior protocols, hypothesizing that inspiratory isometric pelvic floor contraction would boost HRV, whereas expiratory contraction would attenuate it. Method: Sixty participants performed 0.1 Hz breathing under three conditions—no contraction, inspiratory contraction, and expiratory contraction—in randomized, counterbalanced order for 3 minutes each. HRV was assessed via the root mean square of successive differences (RMSSD) and low-frequency HRV (LF-HRV). Results: Consistent with our hypothesis, inspiratory pelvic floor contraction significantly amplified HRV compared to no contraction (RMSSD: d = 1.20, LF-HRV: d = 0.98). Expiratory contraction attenuated HRV relative to both no contraction (RMSSD: d = 0.96, LF-HRV: d = 1.10) and inspiratory contraction (RMSSD: d = 1.72, LF-HRV: d = 1.72). Conclusion: Isometric pelvic floor muscle contraction strongly boosts HRV during 0.1 Hz breathing in a phase-dependent fashion, emphasizing the potential to leverage bodily rhythms for heart-brain entrainment. These findings suggest a novel approach for optimizing breathing interventions and highlight the need for longitudinal studies to assess whether such HRV enhancements translate into improved treatment outcomes.

POSTER SESSION III - 004 | BLINKING BEHAVIOUR AND MORPHOLOGY IN OLDER ADULTS WITH NORMAL COGNITION AND MILD COGNITIVE IMPAIRMENT

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Spontaneous blinking is thought to be an index of dopamine function, and has been shown to be affected by task demands. Increasing evidence points to alterations in blink behaviour and morphology in aging and in conditions such as mild cognitive impairment (MCI). Older adults (60–85 years) with normal cognition and MCI completed two sessions during which electrooculography (EOG) signals were recorded across four conditions: (1) a contour integration task (CIT); in which participants identified the orientation of a contour embedded in visual clutter; (2) a simple reaction time task (SRT); (3) passive viewing of dot motion (DOT); and (4) fixation on a blank screen (REST). We extracted the timing of each blink and characterized blink morphology using peak vertical EOG amplitude and the full-width at half-height blink duration. Preliminary data from 15 participants with MCI and 43 controls revealed that peak blink amplitudes were lower in the MCI group compared to controls. Both groups showed higher amplitudes in the two active conditions (CIT, SRT) relative to passive conditions (REST, DOT). Blink durations did not vary across tasks or groups. Blink rates varied by task, but not across groups, being lower in the DOT condition relative to all other conditions. Secondary analyses will explore to what extent variables such as fatigue, sleepiness, and task performance underlie the group differences. The present findings contribute to a growing understanding of the potential for blink-related biomarkers to index cognitive status in aging.
FUNDING: National Research Council Aging in Place Challenge (AIP011), NSERC to A.B.S., Baycrest Foundation

POSTER SESSION III - 005 | DEVELOPMENTAL TRAJECTORIES OF APERIODIC NEURAL ACTIVITY ACROSS MIDDLE CHILDHOOD

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Aperiodic neural activity, indexed by the exponent (1/f slope) of the power spectrum, has been linked to excitatory/inhibitory dynamics in the brain. Neurodevelopmental evidence suggests that the aperiodic exponent may flatten across childhood. However, this has been hard to validate due to the broad range of ages investigated across studies and limited use of longitudinal data. As such, we investigated the longitudinal trajectories of aperiodic activity across middle childhood in a sample of 339 children (64.3% male) assessed annually from kindergarten (aged 6.05±0.38 years) to 2nd grade. Eyes-open resting state EEG data were recorded using a 34-channel montage and aperiodic activity was estimated using the FOOOF package. Linear growth models revealed a developmental pattern such that, on average, the aperiodic exponent over a frontocentroparietal and frontocentral electrode cluster decreased over time, with a significant Age × Time interaction in the respective models (β's ≤ −0.05, p's ≤ .003). Additionally, there was some evidence of a sex effect with males showing higher exponent values (β's < −0.04, p's = 0.04), which may indicate greater neural inhibition relative to their female counterparts. These findings align with prior work and suggest that aperiodic exponent decays across middle childhood, particularly within frontocentral and frontocentroparietal regions. It may be that this neurodevelopmental decay represents varying maturational changes in glutamatergic and GABAergic signaling and a subsequent shift toward more flexible cortical activity with age.
FUNDING: Funding for this project was provided by The Pennsylvania Department of Health to L.M.G-K.

POSTER SESSION III - 006 | WHY ARE YOU SLOWING DOWN? RELATIONSHIPS BETWEEN PERFORMANCE MONITORING EVENT-RELATED POTENTIALS AND DRIFT-DIFFUSION MODEL PARAMETERS

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Event-related potential (ERP) indices of performance monitoring (error-related negativity, ERN; error positivity, Pe) are often examined separately from behavioral measures such as response times (RTs). This limits insights into how neural activity relates to goal-directed behavior. Understanding ERP-RT relationships is key to interpreting the cognitive processes supporting behavioral adjustments. ERPs are inconsistently related to RTs, likely due to the complex cognitive processes underlying decision making that are not captured by a single mean RT. Drift diffusion modeling (DDM) addresses this issue by decomposing RTs into distinct cognitive components, clarifying the link between neural error responses and subsequent decision making. We recorded ERPs from 107 healthy undergraduates (70 women) during a modified Eriksen flanker task. Multilevel models predicted drift rate (v), decision boundary (a), non-decision time (t), and starting bias (z) from previous-trial ERN and Pe amplitudes, and experimental conditions. Larger ERN and Pe predicted faster evidence accumulation (higher v), suggesting more efficient processing. Pe predicted a more cautious response (higher a) and shorter non-decision time (t), reflecting a more strategic behavioral adaptation. ERN and Pe showed opposing effects on starting bias (z), highlighting distinct contributions to adaptive behavior. These results support theories of cognitive control and error awareness. Integrating ERP and DDM can clarify the behavioral relevance of ERPs to errors in the broader context of goal-directed behavior.

POSTER SESSION III - 007 | FEAR GENERALIZATION TO FACES: THE INTERPLAY OF BOLD ACTIVITY, ATTENTION, AND FEAR RATINGS

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Excessive generalization of fear is assumed to contribute to the etiology and maintenance of pathological anxiety. In a series of experiments, we investigated the role of individual attentional deployment within the genesis of fear generalization. For this purpose, we developed a set of facial fotographs that was manipulated such that pairs of faces could either be distinguished by looking into the eyes or into the region around mouth and nose, respectively. These stimuli were used as CSs in a differential fear conditioning paradigm with a subsequent generalization test by presenting gradual morphs of the original faces. The current study brings this paradigm into the fMRI while also recording eye movements and trial-by-trial threat ratings. Considering ratings, we were able to replicate a moderately curved fear generalization gradient, which was reflected in activation patterns within the insula. While we also replicated that participants who dwelled into diagnostic regions more quickly exhibited less fear generalization within threat ratings, this was not the case for neural activation patterns. We conclude that fear generalization depends on attentional deployment but the underlying neural mechanism remains elusive.
FUNDING: This work was funded by the German Research Foundation (DFG project number 44541416 - CRC 58, project C10 to MG)

POSTER SESSION III - 008 | CHARACTERIZING THE APERIODIC ACTIVITY IN PARKINSON'S DISEASE SUBJECTS WITH AND WITHOUT FREEZING OF GAIT

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Parkinson's disease (PD) is a neurodegenerative disorder associated with abnormal patterns in brain oscillatory activity, particularly in the beta and gamma bands. Recent advances have

enabled parameterization of the brain's spectral content using electroencephalography (EEG) by separating oscillatory from aperiodic components. Currently, it is unknown how PD affects aperiodic activity, and whether PD patients with freezing-of-gait (FOG) have distinct aperiodic exponents (slope) or broadband offsets. This study used resting-state EEGs from 51 participants (25 PD-noFOG,16 PD-FOG,10 age-matched controls (HC)) to quantify aperiodic activity. EEGs were preprocessed using the Harvard Automated Preprocessing Pipeline (HAPPE) with a 0.5-50 Hz bandpass filter, automatic segment and bad channel rejection, and average re-referencing. EEGs were segmented into 5-second epochs, loaded into the Brainstorm software, and a power spectral density analysis was performed using Welch's method (1-second windows, 50% overlap). Aperiodic measures were then extracted using Specparam with the following parameters: frequency range (1-40 Hz), peak width limits (0.5-12 Hz), maximum peaks (3), minimum peak height (3 dB), proximity threshold (2), and "fixed" aperiodic mode (no knee). Aperiodic exponents were lower and offsets higher in PD-FOG compared with PD without FOG and HC, although these differences were not found to be statistically significant ($p = .78$ and $p = .74$ respectively). Future studies are needed to explore whether aperiodic activity in PD varies by brain region or differs across tasks.
FUNDING: UAMS Neurodegeneration Hub Pilot Grant and UAMS Development Enhancement Award (DEAP)

POSTER SESSION III - 009 | NEURAL DYNAMICS OF WORRY: EXAMINING LATE POSITIVE POTENTIAL SLOPE CHANGES IN THREAT PROCESSING

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Worry involves uncontrollable negative thoughts and is associated with elevated motivated attention (late positive potential; LPP) to emotional stimuli. However, because LPP amplitude appears to reflect both early attentional and memory processes, evaluating changes in its amplitude across stimulus processing may be important for understanding attention bias. Therefore, we examined the connection between self-reported worry and LPP slope for threatening stimuli over time. Fifty-eight participants completed the PSWQ and an emotional S1-S2 task using IAPS images. EEG measured LPP slope changes (700-2000ms) to neutral ($\alpha = 0.84, 0.84$) and threat ($\alpha = 0.84, 0.83$) stimuli. A significant negative correlation was found between change in response to threat stimuli (slopeThreat) and PSWQ ($r = -0.31$, $t(55) = -2.43$, $p = .018$, 95% CI [-0.53, -0.06]), linking high worry to faster decline in the LPP. A regression showed high worry was associated with a more negative slopeThreat ($\beta = -0.009$, $SE = 0.003$, $t(52) = -2.67$, $p = .010$), even controlling for sex and mean LPP amplitude. Lastly, longer threat latency increased slopeThreat ($\beta = 0.096$, $SE = 0.015$, $t(52) = 6.54$, $p < .001$), suggesting slower initial responses enhance sustained attention to threat. These findings demonstrate that analyzing the slope of event-related potentials such as LPP can advance the understanding of anxiety-related neural dynamics among worriers, over and above traditional amplitude metrics, offering valuable insights for future research.

POSTER SESSION III - 011 | ALPHA POWER INCREASES WITHOUT NEUROFEEDBACK: A DOUBLE-BLIND SHAM-CONTROLLED STUDY

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Electroencephalographic neurofeedback (EEG-NF) is often assumed to promote active self-regulation of brain activity. However, alpha upregulation observed during training may reflect non-specific factors such as time-on-task. In this preregistered, double-blind, sham-controlled study, 60 healthy adults underwent a single session of alpha EEG-NF (8–12 Hz, Pz), assigned to either a genuine group (real-time feedback) or a sham group (replayed feedback). Feedback update frequency (1, 5, or 10 Hz) and phase (training vs. transfer) were within-subject manipulated. To assess the role of intentional regulation, we also compared these groups to another group from an independent study (Maaz et al., 2025), who passively viewed similar visual feedback without self-regulation instructions. Bayesian hierarchical models revealed a robust linear increase in alpha power over time. Crucially, this increase did not differ between the genuine and sham groups and was also equivalent in the passive group. These results suggest that alpha upregulation during EEG-NF may arise from general, non-specific influences rather than successful self-regulation. Our findings challenge dominant EEG-NF assumptions and highlight the need for improved control conditions and mechanistic understanding of the EEG modulation underlying EEG-NF.
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POSTER SESSION III - 012 | FLANKER-TASK VARIABILITY AND SYMPTOM DIMENSIONS IN PREDICTING ERN AND PE: A MULTILEVEL MODELING APPROACH

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Performance monitoring supports behavioral adjustments and goal-directed action, and impairments in this process can contribute to difficulties across a range of clinical conditions. Event-related potentials (ERPs), including the error-related negativity (ERN) and error positivity (Pe), are commonly used to study performance monitoring in psychopathology. However, links between these neural indices and specific symptoms, such as anhedonia and worry, are inconsistent. A possible explanation is that task design moderates these associations. This study examined whether ERP–symptom relationships vary depending on the version of a flanker task used. A total of 172 healthy undergraduates completed three flanker tasks across two data collection sites. Multilevel models examined whether task version moderated associations between ERPs (ΔERN and ΔPe; error

minus correct trials) and symptoms (anhedonia, worry). Task moderated ΔERN, with one version producing larger ΔERN than the other two. No statistically significant effects were observed for ΔPe. Symptoms were not related to ΔERN or ΔPe. These results suggest that ΔERN is sensitive to flanker task design, offering a plausible contributor to inconsistent findings. In this non-clinical sample, symptom severity did not relate to ERP amplitudes, possibly due to range restriction in symptom severity. Future studies should test clinical group differences and evaluate time-frequency measures of performance monitoring to determine whether they display similar task dependence.

POSTER SESSION III - 013 | GUESSING VERSUS PERFORMANCE: COMPARING THE REWARD POSITIVITY ACROSS THE DOORS AND STOPWATCH TASKS

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Reward processing is an essential component of daily life and is disrupted in mental health conditions such as major depressive disorder. The reward positivity (RewP), an event-related potential (ERP), peaks 250-350 ms after feedback at frontocentral electrodes and is particularly sensitive to rewards over non-rewards. While both the doors (guessing-based) and stopwatch (performance-based) tasks are established methods of eliciting the RewP, little research has directly compared the properties of the RewP across tasks. To meet this end, undergraduate student participants (N = 66) completed both tasks in randomized order while continuous 256-channel EEG was acquired. A three-way repeated measures ANOVA was used to assess the effects of task, feedback type, and electrode on RewP amplitude. RewP amplitudes were greater for reward relative to non-reward trials in both tasks. However, reward and non-reward amplitudes were greater in the stopwatch relative to the doors task. Differences (and similarities) in the spatial distribution of the RewP across tasks were identified. Additionally, while raw amplitudes for reward and non-reward trials were correlated across tasks, reward vs non-reward difference scores were not. Overall, both tasks effectively elicit the RewP, however feedback based on perceived performance may evoke stronger neural responses than those based on guessing. Further, levels of reward reactivity were uncorrelated across tasks. The results highlight the importance of task/context on the magnitude of reward processing and its underlying neural correlates.
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POSTER SESSION III - 014 | PUPIL SIZE DYNAMICS DURING A CATEGORY LEARNING TASK

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The ability to categorize diverse physical stimuli is essential for navigating the changing features of our environment. The brain's functional connectivity, including structures involved in category learning, is influenced by subcortical neuromodulatory systems, which modify the operation regime of cortical networks. The Locus Coeruleus Noradrenergic system (LC-NA), with widespread projections, plays a key role in modulating attention, learning, and memory. Notably, LC activity affects pupillary responses, making pupil diameter a useful noninvasive marker of noradrenergic activity. The "Weather Prediction" (WP) task has been used to study category learning. In this task, participants have to learn to classify eight different visual patterns into two categories. On each trial, a single pattern is presented, participants have to assign the pattern to a category, and then they receive feedback about their choice. Here, we measured pupil size from a sample of 50 participants while performing the WP task. We found that pupil size reliably tracks the learning process of the participants. Analyzing single-trial data, we found two distinct pupil responses, both associated with learning. A first response correspond to a dilation that occurs during the decision moment, which increases as a function of learning. A second response is a dilation that occurs during the feedback period, which decreases as a function of learning. Our results contribute to the study of neuromodulatory dynamics during category learning.

POSTER SESSION III - 015 | NEUROPHYSIOLOGICAL SIGNATURES OF RESPONSE BIAS AND EVIDENCE ACCUMULATION IN THE PROBABILISTIC REWARD TASK

Molly Sapperstein[1], Ty Lees[1,2], Mario Bogdanov[1,2], Jason Scott[1], Brian Boyle[1,2], Shiba Esfand[1], Samantha Linton[1,2], Courtney Miller[1], Mohan Li[1], Sarah Woronko[1], Paula Bolton[1], Shuang Li[1,2], Robert Meisner[1,3], Daniel Dillon[1,2], Diego Pizzagalli[1,2,4]
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Disrupted reward processing is central to several forms of psychopathology. The probabilistic reward task (PRT) is a well-validated paradigm for assessing reward processing and uses asymmetric reinforcement of 'rich' and 'lean' stimuli to elicit a response bias (RB) toward the more rewarded option. Responses in the PRT can be conceptualized as resulting from an interaction between RB and evidence accumulation processes, and electroencephalography (EEG) offers a powerful tool for capturing the neural dynamics underlying these processes. In this study, 36 healthy adults (25 female; aged 33.7 ± 14.7 years) completed the PRT while 96-channel EEG was recorded. As expected, there was a significant block effect on RB ($F(2, 66) = 4.18$, $p = .019$) because participants made more 'rich' responses as the blocks progressed. No such effect was seen for discriminability, which captures ability to distinguish stimuli ($p = .49$). EEG data were segmented time-locked to the initial stimulus, categorized based on response time, and averaged to yield event-related potentials (ERPs). For all trial types, a negative frontocentral ERP emerged prior to stimulus onset, and for slow trials (i.e., response time >0.3 quantile) a positive centroparietal ERP emerged ~1200 ms post-stimulus. Ongoing analyses are integrating these ERPs with computational models of evidence accumulation and decision-making. Overall, these results provide insight into multiple neurocognitive mechanisms (RB, evidence accumulation) recruited

by the PRT, and highlight distinct neural processes that may be targets for intervention.
FUNDING: Funding for the present work was supported by an investigator-initiated grant from Millennium Therapeutics awarded to D.A.P.

POSTER SESSION III - 016 | UNDERSTANDING RAPID AFFECTIVE RESPONSES TO RISKY CHOICE OUTCOMES USING PSYCHOPHYSIOLOGY AND REAL-WORLD RISK-TAKING MEASURES

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Risky decision-making provides a natural framework for evoking affective responses, as surprising wins and losses are emotionally valanced, potent events. In this study, we utilized facial electromyography (fEMG) and skin conductance response (SCR) to capture rapid affective responses to risky choice outcomes. In our task, participants (n=120) completed a series of choices between a 'Certain' option guaranteeing a reward, and a 'Risky' option that resulted either in a win or a loss (i.e., zero outcome) with a described probability. Examining fEMG responses, we observed that affective evaluations of Risky choice outcomes sensitive to both outcome valence and the probability of winning. Specifically, participants manifested potent 'negative' affective responses following unexpected losses, whereas they exhibited robust 'positive' as well as 'negative' affective responses following surprising wins. We further examined individual differences in self-reported real-world risk-taking, using the Domain-Specific Risk-Taking (DOSPERT) scale. While DOSPERT scores did not predict risky choice behavior, individuals with higher DOSPERT scores (i.e., higher likelihood of engaging in risky behaviors) exhibited exaggerated 'positively' and 'negatively'-valanced affective reactivity to unexpected risky choice outcomes. These findings, alongside contemporary models linking emotion dysregulation to problem gambling, motivated us to collect a second dataset of community gamblers (n≈150), with the aim of mapping problem gambling severity onto individual differences in affective reactivity.
FUNDING: CIHR

POSTER SESSION III - 017 | ADAPTIVE CALIBRATION IN EARLY REGULATORY DEVELOPMENT: INTERACTIONS BETWEEN RSA, EMOTION REGULATION, AND PARENTING IN THE CONTEXT OF EF DEVELOPMENT

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Adverse caregiving environments have been found to compromise children's burgeoning regulatory abilities, however, the role of regulatory physiology in these relations remains unclear. This study seeks to apply the adaptive calibration model in examining how RSA reactivity to stress may interact with parenting and early self-regulatory abilities. To assess potential tradeoffs between regulatory skills, we examined how trait emotion regulation interacts with RSA reactivity in the context of negative parenting to predict EF development. Data were drawn from a three-wave study of 150 families, oversampled for risk. Mothers reported on children's emotional lability/negativity via the Emotion Regulation Checklist at age 3. Negative parenting and RSA were examined during a 10-minute challenging mother-child puzzle task at age 3. EF was measured using the Willoughby Battery at ages 3 and 4. A significant three-way interaction was found between observed negative parenting behaviors, children's RSA withdrawal during challenge, and children's emotional lability/negativity in predicting later EF. Results suggest that children with lower trait lability/negativity, but greater RSA reactivity were more susceptible to the effects of negative parenting on their EF development showing less improvement than other children who showed lower trait lability/negativity or less RSA reactivity. This suggests that low lability/negativity in conjunction with greater RSA reactivity may reflect mobilization of energy toward maintaining emotion regulation at the cost of EF development.
FUNDING: K01HD068170 R01HD097189

POSTER SESSION III - 018 | NEIGHBORHOOD OPPORTUNITY DISPARITIES PREDICT BRAIN FUNCTION IN YOUNG CHILDREN

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Using brain imaging data collected in typically developing infants and young children, the present study assessed associations between a child's environment and their ability to encode auditory information. The Child Opportunity Index (COI), an online tool which utilizes United States census data, was used to obtain a measure of each child's opportunity across education, health-environment, and social-economic domains. It was hypothesized that having access to fewer opportunities would be associated with delayed maturation of auditory encoding processes. Auditory encoding and COI measures were obtained from 264 (105 females) typically developing children 2 months to 5 years old (70 with data from multiple timepoints). Magnetoencephalography (MEG) data were collected while the child listened to 500 Hz sinusoidal tones. Source-localization was used to measure the time it took auditory information to reach the child's left and right auditory cortex (measured as the latency of the P2m evoked response). Each child's address was used to calculate a COI score for their metro area. As hypothesized, regressions showed that lower COI education (left hemisphere: $F(1, 215)=6.96$, $R2=0.03$, $p=.01$; right hemisphere: ($F(1, 214)=8.71$, $R2=0.04$, $p=.004$)) and health-environment opportunity scores (left hemisphere: ($F(1, 215)=4.24$, $R2=0.02$, $p=.04$; right hemisphere ($F(1, 214)=4.91$, $R2=0.02$, $p=.03$)) were associated with later (less mature) P2m latency. This demonstrates that a child's environment has a small but statistically significant impact on neural functioning.
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(K01MH108822) and the Eagles Autism Foundation to Dr. Chen (Pilot Grant).

POSTER SESSION III - 019 | PERSON-CENTERED PROFILES OF MATERNAL PSYCHOPATHOLOGY SYMPTOMS AND CHILDHOOD MALTREATMENT PREDICT MOTHERS' DIFFERENTIAL STRESS PHYSIOLOGY IN RESPONSE TO CHILDREN

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Pennsylvania State University

Parental physiological regulation supports children's self-regulation development within parent-child interactions. Yet parents with greater risk factors such as psychopathology symptoms and childhood maltreatment histories show atypical physiological regulation (Lunkenheimer et al., 2018). Since these risks often co-occur, person-centered approaches may clarify how differential risk profiles influence parents' adaptive vs. maladaptive physiological stress responding to children. At-risk mothers with 3-year-old children (N=149) were asked to support children in a challenging dyadic puzzle task. Mothers reported their own depressive and anxiety symptoms and maltreatment during childhood. Respiratory sinus arrhythmia (RSA) was recorded in 30-s epochs during the parent-child task. Resting RSA was measured while watching calm nature videos. Four groups were identified in latent profile analysis: a childhood maltreatment (CM) resilient group, a high-risk psychopathology group, a high-risk CM group, and a low-risk group. The low-risk group, characterized by low symptoms and low CM history, exhibited decreasing RSA across the task, suggesting physiological engagement and support of children. Both groups with CM histories exhibited few RSA changes (flat) during the task, indicating lower reactivity and engagement, but the resilient group showed higher resting RSA whereas the high-risk group showed lower resting RSA. The high psychopathology group showed a drastic quadratic decreasing pattern over time, representing exaggerated reactivity/higher stress when supporting children.
FUNDING: NIH

POSTER SESSION III - 020 | DIFFERENTIAL CONTRIBUTION OF GABA/GLUTAMATE IN NEURAL RESTING STATE ACTIVITY IN TYPICALLY DEVELOPING AND AUTISTIC CHILDREN

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Atypical neural-circuit excitability is a core feature of epilepsy, autism, and schizophrenia. In epilepsy, GABA medications are used to restore the excitatory (E) / inhibitory (I) neural-circuit balance. No method has been shown to provide non-invasive assessment of neural circuit E:I balance, but the 1/f slope of the resting-state (RS) power spectrum is hypothesized to reflect integration of synaptic currents in the brain, providing an index of neural circuit E:I. This balance is largely driven by levels of Glutamate (Glu) and GABA, principal excitatory and inhibitory neurotransmitters in the brain. The present study evaluated a hypothesized association between RS power spectrum slope and relative Glu and GABA concentrations. Neurotypical children (NT, N = 51) and those with autism (ASD, N = 33) 10.0 to 15.6 years old provided whole-head MEG RS power spectra and Glu and GABA concentration via MRS. Analyses focused on parietal-occipital RS MEG and MRS. RS slope was higher in ASD than in TD ($p = 0.04$). No group differences in Glu or GABA concentration were observed (ps > 0.05). In NT, GABA was a strong predictor of RS slope ($r = 0.33$, $p = 0.02$). No association was observed in children with autism ($r = 0.14$). In contrast, simple-effects follow-up of a Group x Glu effect ($p = 0.02$) revealed Glu as a predictor of RS slope in ASD ($r = -0.44$, $p = 0.01$), not in NT ($r = 0.07$). Results support the hypothesized association between brain chemistry and neural-circuit E:I balance, with MEG RS power spectrum a non-invasive, easily obtained measure of neural-circuit function.
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POSTER SESSION III - 021 | THE INFLUENCE OF PUPIL-LINKED AROUSAL ON DYNAMIC BELIEF UPDATING IN ADOLESCENTS AND YOUNG ADULTS

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In order to navigate everchanging environments it is important to maintain a balance between the flexibility to adapt to significant changes and the stability of maintaining a representation of the current state of the world, or oneself. Dynamic Belief Updating (DynBU) posits that the rate, by which the difference between an observation and our expectation is integrated into the belief about future observations, is influenced by two sources of uncertainty: the volatility of the environment and the level of noise associated with observations, operationalized as the latent variables Change Point Probability (CPP) and Relative Uncertainty (RU), respectively. Physiologically, pupil-indexed arousal, a proxy for neuromodulatory inputs, interacts with learning dynamics. Using a change-point (CP) task it has been shown that these dynamics differ between younger and older adults. As adolescence is a period of significant re-organisation on neural and cognitive levels, we aim to establish how DynBU differs between adolescents (12-17 years) and young adults (25-30 years). Our pre-registered study uses a circular CP-task combined with pupillometry and a reduced Bayesian model in order to investigate the interplay of CPP, RU and arousal on belief updates (https://osf.io/4bqc7/). Interim analyses (N = 47; 23 adolescent) suggest a higher impact of CPP on learning rate in adolescent participants, but no difference in RU, suggesting a more liberal updating strategy. The study is ongoing and we project a sample size of N = 110 by October 2025 and will present updated results.
FUNDING: German Research Foundation, DFG-Grant-RI-2853/7-1

POSTER SESSION III - 022 | NEUROCOGNITIVE RESPONSES TO AEROBIC EXERCISE AROUND THE VENTILATORY THRESHOLD: AN ERP INVESTIGATION

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The precise physiological point where exercise no longer confers cognitive benefits remains unclear. Recent evidence suggests that cognitive decline may occur near the ventilatory threshold (VT), a point where ventilation exceeds oxygen consumption resulting in a shift to anaerobic metabolism. The primary objective of this study was to examine changes in neurocognitive function immediately following exercise near VT. Twenty-eight subjects (18-35 years old) completed 20-minutes of aerobic exercise on a treadmill at one of three counterbalanced intensities (10% below VT, at VT, or 10% above VT). An oddball paradigm was completed before and immediately after exercise while EEG data were recorded. A significant trial type main effect on accuracy indicated more accurate responses on frequent trials compared to rare trials. Time and trial type main effects for reaction time were superseded by a time X trial type interaction suggesting faster responses for both trial types following exercise. A trial type main effect for P3 amplitude was superseded by a condition X trial type interaction, $F(2,26) = 6.60$, $p = 0.005$, $\eta p2 = 0.34$, such that the difference between frequent and rare trials in the 10% below VT condition was larger compared to the at VT and 10% above VT conditions. No main effects of interactions were observed for N2 amplitude (ps > 0.05), N2 latency (ps > 0.05), or P3 latency (ps > 0.05). Data from the current investigation may contribute to a deeper understanding of the underlying neurobiological mechanisms explaining the exercise-cognitive function relationship.

POSTER SESSION III - 023 | AGE-RELATED IMPROVEMENTS IN RESPONSE LATENCY DURING ADOLESCENCE FULLY MEDIATED BY MORE EFFICIENT PREMOTOR SELECTION, NOT MOTOR SPEED

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Processing speed is a crucial factor in determining cognitive ability. Speed increases throughout premature development: first rapidly in childhood, then more slowly in adolescence, before finally peaking in young adulthood. While extant literature suggests that all age-related changes in processing speed reflect development of a singular global processing factor, the impacts of age on processing speed can have domain-specific effects depending on stage of development. The current study explored whether age-related improvements in processing speed varied between premotor and motor domains, and whether improvements in these domains distinctly explained age-related improvements in choice reaction time (RT). Adolescent participants ($N = 204$, $M_{age} = 16.5$, $SD_{age} = 1.73$, 66% Female) completed an arrow flanker task while EEG was recorded. We quantified the lateralized readiness potential (LRP) to fractionate RTs into premotor (Stimulus-Locked LRP) and motor (Response-Locked LRP) intervals. Mediation analysis showed a significant indirect effect of Age on RT through Stimulus-Locked LRP latency ($ab = -0.060$, $p = .006$) but not Response-Locked LRP latency ($ab = 0.008$, $p = .469$). This mediation diminished the direct effect of age ($B = -0.036$, $p = .310$), providing evidence that age-related improvements in processing speed during adolescence are fully explained by increases in efficiency of premotor, preferential response selection, and not by improvements in motor processing speed.
FUNDING: R01AA030728

POSTER SESSION III - 024 | THE ERROR RELATED NEGATIVITY IN CHILDREN WITH READING DIFFICULTIES

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Error monitoring is an executive functioning process that plays an important role in reading. It contributes to reading comprehension outcomes beyond other predictors such as word reading. We examined the error related negativity (ERN), an event related potential associated with error monitoring. Fifty-two elementary school children (20 with reading difficulties, 32 typically developing) completed a nonverbal Go/No-go task. The task had an emotional condition (aggressive-looking animal pictures for Go trials) and a neutral condition (non-aggressive animals). Data was recorded with a 128-electrode geodesic sensor net. Preprocessing steps were completed (independent component analysis, filter, epoch, artifact rejection, bad channel interpolation, rereference). The ERN was scored as the mean amplitude from -50to100ms response-locked to No-go errors. The ΔERN was computed as a difference wave. The children also completed standardized reading tests. First, we examined the associations between the ΔERN and reading skills. The ΔERN moderated the relationship between word reading and reading comprehension. For children with word reading difficulties, a larger (more negative) ΔERN was associated with stronger reading comprehension. This finding supports the compensatory account of executive functioning; enhanced error monitoring may compensate for decoding difficulties. Second, we identified differences in how "emotion" modulated the ERN in children with and without reading difficulties. Our study lays the foundation for examining the ERN as a neural marker of reading difficulties.

POSTER SESSION III - 025 | COMPARING ANALYTIC APPROACHES TO MOTHER-INFANT CORTISOL ATTUNEMENT: MIXED-EFFECTS VS. RANDOM-INTERCEPT CROSS-LAGGED MODELS

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Mother-infant physiological attunement—the reciprocal coordination of physiological responses within the dyad—plays an

important role in child well-being and development. Although many analytic strategies exist to examine cross-lagged processes, prior research on mother-infant physiological attunement has primarily used two approaches: mixed-effects linear regression models and structural equation model (SEM)-based cross-lagged panel models. This study directly applied and compared these two analytic strategies—including random-intercept cross-lagged panel models (RI-CLPMs)—to identify the most suitable model for capturing mother-infant physiological attunement. Salivary cortisol data from mother-infant dyads during stress tasks at 6, 12, and 18 months postnatal were analyzed using mixed-effects linear regressions and RI-CLPMs with varying time constraints. Across all three timepoints, results revealed significant discrepancies in autoregressive and cross-lagged effects between the models. Outputs from RI-CLPMs consistently demonstrated the importance of including random intercepts to accurately separate within- and between-dyad processes. Findings suggest that the choice of analytic strategy can meaningfully influence conclusions about mother-infant cortisol attunement. Future research with larger samples across early development is needed to resolve ongoing debates about the presence of cross-lagged mother-infant cortisol attunement.
FUNDING: Society for Research in Child Development Victoria S. Levin Award (early career award, no number)

POSTER SESSION III - 026 | THE EFFECT OF EFFORT EXPENDITURE ON THE NEUROPHYSIOLOGICAL INDICES OF REWARD PROCESSING IN EARLY ADOLESCENCE

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Reward and motivation are two cognitive processes that drive goal-directed behaviors and are closely linked to the development of psychopathology. One behavioral measure of motivation is effort expenditure - the amount of effort exerted to attain a desirable outcome. In adults, higher effort expenditure has been linked to heightened neural responses to reward cues, but diminished responses to reward anticipation and feedback. However, it is unclear whether similar patterns exist in early adolescence, a critical period for the development of reward- and motivation-related processes. Using event-related potentials, we examined the effort-reward relationship in a community sample of 92 10-to-13-year-olds (53 females, Mean/SD of age = 12.06/1.20 years). Unlike adults, greater effort increased youths' attention to reward cues and anticipation, indexed by a larger cue-elicited P3 and a larger stimulus-preceding negativity (SPN), respectively. Higher effort was also associated with lower overall valuation of reward feedback, as reflected in a smaller reward positivity (RewP), although effort did not influence the feedback-elicited P3 or late positive potential (LPP). These differences relative to adults may be associated with the maturation of reward-related regions (e.g., prefrontal cortex) during adolescence. Our findings of the neural substrates of effort-based reward processing will inform the mechanistic understanding of developmental psychopathology, as alterations in motivation and reward sensitivity have been implicated in conditions such as depression in adolescents.
FUNDING: NIGMS Centers of Biomedical Research Excellence (P30 GM114748)

POSTER SESSION III - 027 | CLEARED BUT NOT RECOVERED: PERSISTENT STARTLE REACTIVITY CHANGES AFTER CONCUSSION IN ADOLESCENT ATHLETES

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Sports-related concussions may result in difficult-to-detect yet impactful neurophysiological changes which extend well beyond when clinical recovery thresholds deem athletes ready to return to sport. This preliminary study examined changes in acoustic general startle reactivity (GSR) among Concussed and Healthy control adolescent contact sport athletes (total N = 41) at one month (Time 1) and three months (Time 2) post-clearance to return to sport. At Time 1, the Concussed group (n = 18)'s GSR was less than half and significantly lower than that of the Healthy control group (n = 23), suggesting that post-concussion sensorimotor deficits could persist for at least one-month after being cleared to return to activity as normal. By Time 2, GSR no longer appeared to differ between the groups, suggesting that sensorimotor deficits may have recovered by three months after clearance to return to sport. Taken together these findings indicate persistent effects on physiological reactivity post-concussion such that Concussed athletes exhibit attenuated GSR for at least one month beyond current clinical recovery thresholds. Furthermore, the observed residual effects on GSR may abate by around three months after clearance to return to sport. This preliminary evidence of lingering post-concussion effects highlights potential for physiological markers like GSR to improve concussion assessment and recovery monitoring but warrants further investigation with larger samples and extended follow-up periods.
FUNDING: Building Interdisciplinary Research Careers in Women's Health (BIRCWH) Grant: 5K12AR084233-03

POSTER SESSION III - 028 | AUTONOMIC DIFFERENTIATION OF DISGUST SUBTYPES USING CLUSTER ANALYSIS

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Towson University

Discrete and functional theories of emotion propose that emotions can be distinguished by measurable behavioral and physiological characteristics. The emotion of disgust has been theorized to include the distinct subtypes of physical and moral disgust, but these have not been systematically tested within a multivariate autonomic framework to assess whether they are physiologically differentiable. In this study, 48 participants viewed videos designed to induce sadness, anger, physical disgust, and moral disgust, while a selection of autonomic measures was collected. Univariate analyses provided inconsistent

evidence for differentiation among the various emotion states. However, using a multivariate cluster analytic approach, we found that moral but not physical disgust could be reliably classified and differentiated from other emotions at an above-chance rate. These findings offer some empirical support for the differentiation of disgust subtypes and contribute to the growing evidence highlighting the value of multivariate measurement and analysis in distinguishing between emotions.

POSTER SESSION III - 029 | THE VIRTUAL PARTY TASK: AN UPDATED APPROACH TO MEASURE NEURAL RESPONSES TO POSITIVE AND NEGATIVE PEER FEEDBACK IN YOUTH

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We developed a peer feedback EEG task, Island Getaway, over 10 years ago and have shown that it reliably elicits the reward positivity (RewP) enhanced for positive vs. negative social feedback. However, task updates were needed for gender inclusion and more modern graphics. Here we present preliminary analyses with the new Virtual Party (VP) task. Participants (n=52) ages 8 through 12 (M=9.69±0.19) completed VP and self-report measures of positive affect and reward responsiveness. Temporospatial principal component analysis (PCA) and robust ANOVA revealed a series of components consistent with prior social feedback tasks. In particular, a component consistent with RewP was enhanced to like vs. dislike peer feedback (T(WJt)/c(1.0,47.0)=6.55, p=.013), and participants gave more likes to peers who liked them more often (t(50)=2.69, p=.0096), supporting the effectiveness of the feedback manipulation. PCA-defined RewP was scored at CP2 from 276 to 326 ms, while standard RewP was scored at Cz from 250 to 350 ms. Both PCA-defined RewP and standard RewP were negatively related to total participant like votes (rs.67). Results suggest that Virtual Party elicits similar reward-related ERPs and behavioral changes to prior tasks and correlates with other indicators of reward responsiveness. Children with higher RewP may have viewed likes as more salient, resulting in giving fewer like votes.
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POSTER SESSION III - 030 | THE ROLE OF EMOTION REGULATION IN PHYSIOLOGICAL EXPERIENCE OF LIFE REGRET: A PILOT STUDY

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While life regret is often linked to reduced well-being and health, much of past research is based on self-report measures. Little is known about the physiological responses associated with reminiscing a regret, or how different emotion regulation strategies may moderate these responses. Accordingly, we conducted a pilot study exploring the efficacy of emotion regulation strategies (i.e., cognitive reappraisal and suppression) in reducing physiological arousal during a life regret induction. Thirthy-four undergraduate students completed a self-report measure of emotion regulation, then thought about their biggest life regret for 3 minutes. During the induction, measures of heart rate variability (analyzed as respiratory sinus arrythmia; RSA), and skin conductance response (SCR) were recorded to measure parasympathetic and sympathetic activity, respectively. Results revealed a significant effect of reappraisal or suppression on the number of SCR, $t(34) = 3.46$, $p < .001$), but not on RSA or mean SCR. Notably, our small sample of young adults may not have life regrets intense enough to elicit physiological responses. Nevertheless, consistent with our predictions, small (but statistically insignificant) effects suggest a potential relationship in which higher reappraisal ($\beta = -.41$, $p = .53$) and suppression ($\beta = -.27$, $p = .46$) were associated with reduced SCR responses. Testing on a larger, more diverse sample may strengthen these trends and clarify the relationship between emotion regulation and the physiological effects life regret.
FUNDING: NSERC, SSHRC

POSTER SESSION III - 031 | THE COGNITION OF EMOTION: HOW COGNITIVE CONTROL AND WORKING MEMORY UNDERLY EMOTION REGULATION STRATEGY DIFFERENCES

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Working memory (WM) is critical for understanding emotion regulation (ER) and cognitive control, acting as a foundational resource for managing thoughts, emotions, and behaviors. This study investigated how working memory capacity (WMC) affects Frontal Midline Theta (FMT), an EEG marker for cognitive control, during emotional suppression and cognitive reappraisal. Participants completed an Operation Span WM task and an ER task, viewing negative and neutral images under passive viewing, emotional suppression, and cognitive reappraisal conditions. They rated image pleasantness and arousal after presentation. Cognitive reappraisal significantly increased pleasantness and decreased arousal for negative images compared to passive viewing. FMT power was significantly higher in both regulation conditions than in passive viewing. A significant negative correlation was found between WMC and FMT, indicating that individuals with higher WMC exhibited reduced FMT during cognitive reappraisal compared to passive viewing. This suggests high WMC individuals need less cognitive control for reappraisal. These results emphasize WMC's nuanced role in ER, proposing personalized strategies based on cognitive profiles to optimize emotional outcomes.

POSTER SESSION III - 032 | BRIDGING VISION AND EMBODIMENT: HOW DUAL SYSTEMS SUPPORT FACIAL EMOTION RECOGNITION

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The debate between visual-conceptual and embodied models of facial expression recognition has yielded contradictory evidence: patients with facial paralysis often retain recognition abilities, yet experimental manipulations impair performance. We propose a threshold-gated, two-library model where dual neural systems cooperate based on stimulus features and neurodevelopmental history. Across three studies, we tested this model in a large normative sample (n=117), individuals with congenital Moebius syndrome (n=15), and adults with acquired facial paralysis (n=19). Participants viewed high-intensity prototypical expressions (ADFES) and subtle graded displays (JeFEE), while we measured recognition accuracy, perceived intensity, and—in Moebius participants—μ-rhythm dynamics and functional connectivity. Results revealed a dissociation: prototypical expressions were recognized across groups, indicating sufficient visual-template processing, whereas paralysis severity tracked impaired recognition of graded expressions, establishing a causal role for sensorimotor feedback. EEG analyses revealed reduced μ-band connectivity between sensorimotor cortices and face-selective regions in Moebius syndrome, suggesting latent reorganization masked by behavioral compensation. This double dissociation shows that visual templates support rapid decoding of clear expressions, while sensorimotor simulation becomes necessary for subtle discrimination, shaped by developmental timing. Findings bridge competing theories and suggest new rehabilitation approaches for facial-motor impairments.
FUNDING: Cassa di Risparmio di Padova e Rovigo (CARIPARO)

POSTER SESSION III - 034 | ADOLESCENTS' THETA OSCILLATIONS TO SELF-RELEVANT FEEDBACK FROM FRIENDS AND INTERNALIZING SYMPTOMS

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Adolescents are highly sensitive to peer feedback, shaping self-view and mental health. Negative feedback is linked to internalizing symptoms, yet the neural processes underlying self-view updating remain unclear. EEG time–frequency (TF) analysis captures rapid neural dynamics during feedback processing. This study used a self-relevant peer feedback task to investigate self-view updating in adolescents. EEG TF analysis isolated neural oscillations linked to feedback processing to identify neural correlates of self-view updating and examine associations with internalizing symptoms. We specifically focused on FCz theta activity, which increases following unexpected or negative feedback. Eighty-nine adolescents (ages 9–21) completed a two-phase task. In the rating phase, adolescents judged themselves and a friend on positive and negative adjectives. In the feedback phase, adolescents predicted their friend's evaluation and received feedback. EEG theta power at FCz (150-300ms) was extracted. Internalizing symptoms, depressive symptoms, and friendship quality were assessed via questionnaires. Task effects showed that theta power was higher following incongruent-negative feedback compared to congruent feedback. Partial correlations, adjusting for friendship quality, showed that theta power to incongruent-negative feedback correlated negatively with internalizing symptoms and depressive symptoms. Low theta responses to negative peer feedback in adolescents with higher internalizing symptoms suggest diminished neural monitoring of negative social evaluation.

POSTER SESSION III - 036 | THE EFFECT OF EXTINCTION TRAINING WITH UNPAIRED US AND US ONLY PRESENTATIONS ON THE CONTEXTUAL RENEWAL OF HUMAN FEAR CONDITIONING

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Past research has shown that contextual renewal of conditional fear can be reduced if unconditional stimuli (USs) are presented unpaired with the conditional stimuli (CSs) during extinction training. The current study assessed whether this is a product of strengthened extinction learning due to the unpaired presentation of the stimuli that had been paired during acquisition or to habituation to the US. Three groups of participants were presented during extinction training conducted in a different context with either: (1) CSs only (CS alone), (2) CSs and unpaired USs (Unpaired) or (3) USs only (US alone). Contextual renewal indicated by electrodermal responses and US expectancy is expected to occur in group CS alone. Renewal will be reduced in groups Unpaired and US alone if the reduction of renewal after unpaired extinction is due to habituation to the US, but only in group Unpaired if it is due to strengthened learning of a CS+-NoUS association. Analysis of US expectancy revealed that in group Unpaired US expectancy during the CS+ decreased relative to acquisition, whereas US expectancy during the CS− increased. By the end of extinction, US expectancy during CS+ and CS− converged. This suggests that unpaired USs promoted intermittent trace conditioning to CS+ and CS− which maintains a high level of prediction error during extinction training. The electrodermal response results are forthcoming.
FUNDING: The work was supported by the Australian National Health and Medical Research Council (GNT1156490)

POSTER SESSION III - 037 | AN OSCILLATORY HIERARCHY ACROSS THE BRAIN AND BODY

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Phase-amplitude coupling (PAC) is a mechanism of information exchange in the brain, in which the phase of a slow EEG oscillation modulates the amplitude of a faster one. Extensive evidence

supports the role of theta-gamma PAC in memory processes, especially involving the encoding of items in working and episodic memory (e.g., Lisman & Jensen, 2013). Recent work has found that EEG oscillations are also modulated by slower autonomic cycles. Sargent et al. (2024) observed that high-frequency heart rate variability (HF-HRV), which reflects cyclical fluctuations in heart rate associated with respiration, modulates the amplitude of EEG oscillations. To evaluate hierarchical relationships in oscillatory communication across the brain and body, the present study examined whether heart-brain coupling is associated with theta-gamma coupling. We observed that theta-gamma PAC correlates with HRV-EEG PAC (n=71), with between-subject r-values ranging from .27 for HRV-alpha PAC to .70 for HRV-gamma PAC (p=.023 and <.001, respectively). To assess within-subject temporal relationships between HRV and theta-gamma PAC, we developed a method for measuring three-way oscillatory interactions based on an approach for quantifying event-related PAC (Voytek et al., 2013). Our method treats each HF-HRV cycle as a trial and examines phase-amplitude relationships between theta and gamma across trials at each point of the HF-HRV cycle. By doing so, we can determine whether autonomic cycles modulate theta-gamma coupling and, by extension, influence computational processes in the brain.
FUNDING: R01 MH110544 R01 MH110544-S1

POSTER SESSION III - 039 | GRADUAL REDUCTION OF THE INTENSITY OF UNCONDITIONAL STIMULUS ATTENUATES THE REINSTATEMENT OF FEAR: A MULTIMETHOD STUDY OF HUMAN FEAR CONDITIONING

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Fear extinction is a Pavlovian learning process whereby acquired fearful responding to a conditional stimulus (CS) previously reinforced by an aversive unconditional stimulus (US) is extinguished over repeated unreinforced trials. However, conditional fear of the CS returns, as the CS-US association is not unlearned. In prior work with rodents, gradually reducing US intensity across CS presentations at the onset of extinction attenuated the return of conditional fear. Here, a pre-registered multimethod experiment was conducted to test whether these effects translate to humans. Participants (N=123, Mage=19.97) were randomly assigned to three groups, Standard Extinction (SE; n=40), Gradual Extinction (GE; n=41), and Gradual-reverse Extinction (GR; US intensity gradually increased; n=42). All underwent habituation and acquisition on Day 1, extinction on Day 2, and tests on Day 10. Skin conductance responses (SCRs) and electrocardiogram were recorded online, while expectancy ratings of US likelihood, US unpleasantness, and subjective fear of the CS were collected after each trial. Bayesian multilevel modeling found no evidence of group differences in the spontaneous recovery, reinstatement by the US alone, or re-acquisition of conditional SCRs. Nonetheless, relative to SE, GE (not GR) attenuated the reinstatement and accelerated the re-extinction of all self-report expectancy. While cardiac data awaits analysis, preliminary results are partially in accordance with prior animal work, suggesting divergence across units of analysis not uncommon in human fear conditioning research.

POSTER SESSION III - 040 | CONTEXTUALIZING THE VAGAL TANK THEORY: PHASIC MEASURES AS MODERATED PREDICTORS

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Baseline heart rate variability (HRV) is a putative measure of psychophysiological resilience, predicting phasic HRV changes in response to environmental demands. Vagal Tank Theory proposes that phasic HRV itself is adaptive and an independent predictor of adaptability and health, sensitive to both stressors (Reactivity) and restorative experiences (Receptivity). However, current research neglects the study of phasic HRV and moderators like gender differences in the association between health and HRV remain underexplored. Using a behavioral ecology framework, we tested both baseline and receptivity as predictors of reactivity to a subsequent stressor, in interaction with gender. We modeled HRV as the root-mean square of successive R-R intervals across stages: baseline, following a restorative experience (contemplative practice), directly before a stressor, during a physical stressor (CO2 task), and after the stressor. Reactivity was modeled through a piecewise growth curve, and receptivity was defined as post contemplative practice HRV minus baseline. Multilevel growth modeling ($F(5,92)=4.07$, $p=.002$, adjusted $R2=.14$) showed that both baseline and receptivity predicted lower reactivity (respectively $\beta=-0.008$, $p=.040$; and $\beta=-0.040$, $p=.002$), but only receptivity interacted with gender, inverting the prediction for women ($\beta=0.055$, $p<.001$). Our results suggest that both baseline HRV and receptivity to resources may impact resilience to stress, and that contextualized analyses should rely on HRV changes to explore the compound effects of individual and environmental differences.

POSTER SESSION III - 041 | TEST–RETEST RELIABILITY OF ELECTROPHYSIOLOGICAL CORRELATES OF MOTIVATED AND VOLUNTARY ATTENTION: GROUP -AND CASE-BY CASE ANALYSIS

Harald Schupp, Karl-Philipp Flösch, Ursula Kirmse, Tobias Flaisch
University of Konstanz

This study examined the temporal consistency of electrophysiological markers of motivated and voluntary attention, both at the group level and within individuals. Seventeen healthy young adults participated in two EEG sessions spaced one week apart. Each session included two blocks presenting highly arousing images (erotic or mutilation) alongside low-arousing control stimuli. Voluntary attention was manipulated via an emotion categorization task, in which either high- or low-arousal images served as targets in separate blocks. EEG analyses revealed three key findings. First, at the group level, emotional modulation of the EPN and LPP components (high vs. low arousal) demonstrated excellent and good test-retest reliability, respectively. Second, the P3 effect (target vs. non-target) showed

excellent temporal stability. Third, individual-level analyses refined the group findings: most participants exhibited reliable EPN, LPP, and P3 effects across sessions. In terms of effect magnitude, EPN and P3 components were highly consistent within individuals, whereas LPP amplitudes showed greater variability. These results indicate the temporal reliability of neural markers related to motivated and voluntary attention at both the group and individual levels. Crucially, individual analyses provide complementary insights, enhancing and contextualizing interpretations derived from group averages.
FUNDING: Deutsche Forschungsgemeinschaft

POSTER SESSION III - 043 | UNMOTIVATED FOR REWARD: DOES ANGER BLUNT CHANGES IN REWARD RESPONSIVENESS?

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Electroencephalography (EEG) has identified the reward positivity (RewP) as an indicator of reward monitoring; larger rewards and greater approach motivation enhance RewP amplitude. Approach-motivated anger also enhances RewP amplitude. While typically conceptualized as an externalized, approach-motivating emotion, anger can also be internalized or avoidance-motivated. This experiment investigated the effect of anger on reward monitoring, with the hypothesis that an avoidant affective state would attenuate neural reward response. Fifty-nine undergraduates participated in a paradigm designed to induce anger and then competed in a performance task while EEG was recorded. We used time-frequency analysis to separate neural processes of basic reward and loss responses which are typically averaged together during ERP calculation. Results replicate prior literature demonstrating that midfrontal theta (3-7Hz) activity drives ERPs related to loss monitoring, while centroparietal delta (1-3Hz) activity accounts for ERPs related to reward monitoring. Moderated regression models show differences by motivation and trait affect: individuals who reported greater trait reward responsiveness tended to exhibit greater delta amplitude only on competitive trials ($r=0.28$, $p=0.03$), while individuals reporting greater trait anger exhibited greater theta amplitude on noncompetitive trials ($r=0.33$, $p=0.01$). These results suggest that anger, which is possibly withdrawal motivated, can attenuate reward responses and potentiate loss responses.

POSTER SESSION III - 044 | INTRACRANIAL EVIDENCE FOR ATTENTION-INDEPENDENT VERBAL EMOTION PROCESSING IN THE AMYGDALA

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Reading is a relatively recent development in the evolution of the homo sapiens. Still, seemingly abstract words elicit emotional reactions. To date, the neural mechanisms underlying the processing of emotional language remain poorly understood. Some postulate that it underlies the amygdala, but data on this is inconclusive. In this study, we investigated whether gamma-band activity (GBA, > 30 Hz) in the amygdala encodes emotional salience in words. Furthermore, we examined whether these effects are modulated by selective attention allocated towards or away from emotion. Eleven patients with intracranial EEG implantations in the amygdala were viewing a series of positive, neutral, and negative nouns, while one valence was assigned as the target condition. Afterwards, they were tasked with a free word recall. We observed improved memorization of emotional compared to neutral words. GBA analysis revealed a significant increase in amygdala low GBA (42.50 to 47.50 Hz) for both positive and negative words between 460 ms and 550 ms post-stimulus. Notably, selective attention to valence did not modulate amygdala GBA. These findings suggest that while emotional words are processed outside traditional reading networks, this likely occurs after initial semantic encoding. Overall, these findings offer new insights on the brain mechanisms that underlie the processing of emotional words.
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POSTER SESSION III - 045 | NEURAL INDICES OF COGNITIVE FATIGUE DURING ONGOING PROCESSING SPEED TASK PERFORMANCE IN PEOPLE WITH MULTIPLE SCLEROSIS

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Multiple Sclerosis (MS) is a neurodegenerative, demyelinating disorder. People with MS (PwMS) often report experiencing cognitive fatigue, which can significantly disrupt their performance in tasks of daily living. Cognitive fatigue is the exacerbation of fatigue over time while engaging in cognitively demanding activities. In the present study, we identified novel indices of cognitive fatigue during ongoing performance of a processing speed task in PwMS. We hypothesized that PwMS would demonstrate a steeper decline in cognitive performance as a function of time-on-task in comparison to healthy control participants. Study participants completed a computerized Symbol Digit Modalities Test (cSDMT), which was adapted from a neuropsychological test that is well validated for MS. Response speed was recorded for each trial, and event-related potentials (ERPs) were derived from ongoing electroencephalographic (EEG) data recorded during task performance. The behavioral findings of the present study provide preliminary evidence that cognitive fatigue diminishes the benefits of increasing task efficiency with increased time-on-task in PwMS compared to controls. ERP findings showed an anteriorization of P1 and P3 amplitude as MS participants progressed through the task, suggesting inefficient use of neural resources across the cSDMT by the MS group compared to controls. ERPs may therefore serve as sensitive indices of the induction of cognitive fatigue with increased time-on-task

in PwMS, which can enable more precise management of fatigue symptoms in PwMS.
FUNDING: National Multiple Sclerosis Society (NMSS)

POSTER SESSION III - 046 | PHARMACOLOGICAL CLUSTERING REVEALS BLOOD PRESSURE RESPONSES TO INTOXICATION ARE INFLUENCED BY SPEED OF ALCOHOL METABOLISM

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Chronic alcohol use increases hypertension risk, but how acute intoxication affects blood pressure (BP) in the moment remains understudied. Understanding these acute effects can be crucial in identifying alcohol-related physiological decline before chronic disease onset. This study captured dynamic cardiovascular responses across the blood alcohol concentration (BAC) curve and considered individual differences in alcohol metabolism. Continuous BP was recorded for 2 hours in 56 healthy participants (21-29 years, 50% female) after they consumed a moderate dose of alcohol (0.4g/kg ethanol) or a placebo beverage. K-means clustering was performed on pharmacokinetic features (peak BAC, time-to-peak, elimination rates, curve shape) from 25 subjects in the alcohol condition. Two metabolic clusters (Fast, Slow Metabolizers) were identified. Mixed-effects modeling showed that both clusters exhibited similar BP time courses, with BP dropping below baseline, then gradually recovering. However, the clusters differed significantly in response magnitude, particularly when accounting for typical drinking pattern (Binge vs Non-binge Drinkers; $F(2,423775)=8.65$, $p=0.0002$). Among binge drinkers, Fast Metabolizers showed more pronounced curvilinear BP changes than Slow Metabolizers ($t(423775)=4.09$, $p<0.0001$). This suggests that binge drinking carries higher cardiovascular risk for individuals who metabolize alcohol faster. Fast alcohol elimination may lead to drinking at higher quantities or more frequently, which, in turn, could exert greater loading on the cardiovascular system.
FUNDING: NIAAA R01AA027017 NIAAA F31AA031620

POSTER SESSION III - 047 | CAUGHT IN THE LIKES: SOCIAL MEDIA SHAPES NEURAL RESPONSES TO EMOTIONAL CONTENT AND INHIBITORY CONTROL

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Emotional stimuli possess a remarkable capacity to instinctively command and redirect our attention. Social media companies capitalize on this attention-emotion relationship by designing algorithms that prioritize and amplify emotionally charged content, thereby increasing user engagement. This constant exposure to intensified emotional content can lead to emotional exhaustion, contribute to heightened anxiety and mood disorders, and potentially desensitize users to real-world emotional cues. This study examined social media use (SMU) and emotion-specific attention. Forty participants completed a modified go/no-go task with emotional and neutral images, while EEG data were recorded. SMU was obtained through Screen Time features on participants individual devices. Results showed SMU significantly impaired inhibitory performance for No-Go cues paired with positive emotional images. EEG data supported these findings, showing a positive correlation between P3b amplitude—an established marker of attention allocation—and SMU in the Positive No-Go condition. These results indicate that frequent social media users recruit more neural resources to inhibit positive stimuli, often unsuccessfully. The specificity of this effect to positive emotional content likely reflects the reward-based conditioning prevalent in social media, such as likes and comments. These findings suggest that SMU may uniquely shape attention allocation processes, with implications for understanding attention difficulties and fostering healthier social media habits.

POSTER SESSION III - 048 | FEASIBILITY OF A TACTILE P3-BASED BRAIN-COMPUTER INTERFACE FOR PEOPLE IN THE LOCKED-IN STATE DUE TO AMYOTROPHIC LATERAL SCLEROSIS: A LONG-TERM SINGLE CASE STUDY IN A PATIENT'S HOME

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P3-based brain-computer interfaces (BCIs) allow for communication via non-muscular, non-invasive electroencephalography signals, primarily the event-related potential P3. They have been applied successfully in various contexts with end-users in the locked-in state / locked-in syndrome (LIS). Yet, it is still a massive challenge to overcome the limitations of the commonly used visual stimulation for P3 elicitation. Vision-independent alternatives have been developed, e.g., with auditory or tactile stimuli. But despite promising findings with healthy participants, studies with severely paralyzed users remain scarce. We present a long-term study of a user with LIS due to amyotrophic lateral sclerosis to evaluate a vision-independent P3-based BCI over the course of two years at the user's home. The user preferred tactile over auditory stimulation and a multi-class over a two-class BCI. After using four classes for 30 sessions, he preferred upgrading to six classes for 39 additional sessions. We consistently found distinct P3 patterns and BCI performances significantly above chance level, despite technical challenges and disease progression. Our findings demonstrate the persistence of the tactile P3 and the feasibility of a tactile P3-based BCI for end-users with the LIS. This merits further user-centered research in combination with technical BCI optimizations and expanded applications with end-users.
FUNDING: Funding by the Lotte Schopper-Stiftung. The text reflects solely its authors' views.

POSTER SESSION III - 049 | ALTERED PAIN PROCESSING FOLLOWING ANALGESIC SUGGESTIONS IS CHARACTERIZED BY SHARED NEURAL FLUCTUATIONS

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Pain perception is shaped not only by nociceptive input but also by cognitive factors such as expectation and suggestion. Hypnosis, defined as a state of "focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion" (Elkins et al., 2015), offers a powerful method to modulate pain experiences. We recorded fMRI data from 23 participants exposed to hypnotic suggestions for hyperalgesia (increased pain), analgesia (pain relief), and a matched neutral condition. After each suggestion (~2 min), cutaneous electric stimulations were delivered and subjective pain ratings collected. We used intersubject correlation (ISC) analysis to assess shared neural fluctuations during suggestions, with hypnosis-relevant traits and pain modulation examined as between-person factors. Pain ratings confirmed effective modulation (Hyper > Neutral: $t(22) = 3.43$, $p = .003$; Analgesia > Neutral: $t(22) = -2.48$, $p = .02$). The strongest ISC was observed for analgesia versus hyperalgesia in somatosensory cortices and posterior insula (peak r difference = 0.37, FDR < .05), highlighting changes in pain processing. Interestingly, higher ISC was also found in temporal regions, which may reflect the linguistic encoding of analgesic suggestions, reactivating during pain. Using a model-free approach, we reveal how pain-related brain dynamics become more temporally aligned across individuals under cognitive modulation, offering new insight into the shared neural architecture of pain relief.
FUNDING: Fonds de recherche du Québec

POSTER SESSION III - 050 | ERPS TO FACIAL EXPRESSIONS OF PAIN ARE MODULATED DIFFERENTLY BY DIFFERENT EMPATHY TASKS: EVIDENCE FROM MASS UNIVARIATE STATISTICS

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Empathy is a multidimensional construct including affective and cognitive aspects. While many ERP studies claim that different ERP components reflect distinct empathy constructs, most studies use a single empathy task, tapping only one construct, and few investigate neural responses to faces. In a within-subjects ERP study, 100 participants viewed painful and neutral facial expressions primed by images of body parts experiencing painful or neutral stimulation while performing four different tasks. Participants rated their own level of discomfort (Affective Sharing/AS), their concern for the person experiencing the pain (Empathic Concern/EC), how much pain they thought this person was in (Perspective-Taking/PT), and how masculine/feminine the face looked (control). We used data-driven mass univariate analysis to perform statistical tests at every timepoint and electrode. We observed widespread effects of pain for all empathy tasks, starting 100-150ms from face onset; this effect persisted past 400ms only for the affective empathy tasks (AS, EC). The pain effect was strongest and most widespread for the AS task, followed by the EC task and was weakest and most restricted for the PT task. No effect of pain was observed for the control task, reflecting task-related top-down empathy effects on face processing. Overall, ERPs to faces were modulated differently depending on the empathy construct. Implications for theories of empathy, face processing, and social cognition will be discussed.
FUNDING: Natural Sciences and Engineering Research Council of Canada (NSERC)

POSTER SESSION III - 051 | CAN PHYSICAL FITNESS SHIELD YOUR CARDIAC VAGAL TONE FROM LIFETIME AIR POLLUTION EXPOSURE? INSIGHTS FROM THE CZECH 4HAIE STUDY

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Little is known about the balance between health benefits of physical fitness and activity and detrimental effects of air pollution (AP), as well as underlying biological pathways. This study examined whether cardiorespiratory fitness modifies the association between lifetime AP exposure and cardiac vagal modulation, indexed by heart rate variability (HRV). The sample comprised 890 adults aged 18-65 years from the Czech Study Healthy Aging in Industrial Environment. Lifetime exposure to PM2.5, PM10, NO2, SO2 was retrospectively calculated. Cardiac vagal modulation was assessed using supine 1-lead-ECG-based HRV, including HF-HRV and RMSSD. Participants were stratified into 3 cardiorespiratory fitness groups. Kendal´s partial Tau and multivariate regression with contrast analysis were employed. Both HF-HRV and RMSSD negatively weakly correlated with all or most of the pollutants independently of covariates. The association was more pronounced in participants with very poor/poor fitness (unfit)(τ=-0.11 to -0.14;$p \leq 0.046$) while it dissapeared in those with fair/good or superior/excellent fitness (fit). Additionally, high PM2.5(31.4-45μg/m^3) and NO2(13-29μg/m^3) exposures were linked to 22%-46% HF-HRV and RMSSD reductions in unfit individuals. Higher lifetime exposure to AP was associated with reduced cardiac vagal modulation and these associations were more pronounced in unfit and inactive individuals and abrogated in fit and active individuals, suggesting that fitness and PA may mitigate the AP-related cardiac vagal withdrawal.
FUNDING: This study has been produced with the financial support of the European Union under the „Life & Environment Research Center Ostrava" (LERCO) project (CZ.10.03.01/00/22_003/0,000,003) via the Operational Programme Just Transition, and by the project „Research of Excellence on Digital Technologies and Wellbeing CZ.02.01.01/00/22_008/0,004,583" which is co-financed by the European Union.

POSTER SESSION III - 052 | DOES PSYCHOPATHIC MEANNESS MODULATE THE N170 TO FACIAL EXPRESSIONS?

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Psychopathy is characterized by affective and antisocial traits which exist subclinically within the general population. Little work has examined how psychopathic traits influence perception of other's emotional expressions, especially at the neural level. Recent work reported that increased psychopathic meanness traits led to decreased N170 amplitudes to happy, angry, and most reliably fearful faces, although on inconsistent electrode sites. Others found that callousness, a facet of primary psychopathy that closely corresponds to meanness, did not influence the N170. This project sought to replicate previous work using both classical and mass-univariate ERP analyses (N = 114, goal N = 160), including measures for both meanness (TriPM scale) and primary psychopathic traits (LSRP scale). Classical analysis found that meanness unexpectedly increased the N170 for neutral, angry, and fearful expressions but only at one left hemispheric site, while increased primary traits correlated with a reduced N170 on the right hemisphere for all emotions. In contrast, data-driven full-scalp mass univariate analyses did not reveal any significant trait-ERP correlations on the N170. Due to the lack of consistency across studies and across analysis methods, we caution against making strong conclusions on the impact of psychopathic traits on facial expression processing at the neural level. More work is needed to replicate these results.
FUNDING: Tri-Agency funding: NSERC

POSTER SESSION III - 053 | IMPULSIVITY MODERATES MOTOR AND NEURAL APPROACH RESPONSES TO APPETITIVE STIMULI IN THE MOBILE APPROACH-AVOIDANCE TASK

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Past work with the mobile approach-avoidance task (AAT) has advanced our understanding of motivational tendencies by comparing emotional stimuli against neutral stimuli. However, neutral stimuli lack motivational salience, leaving questions about how conflicting behavioral and neural responses shape performance. This study built upon this foundation by directly contrasting dessert and disgust images while examining how levels of impulsivity moderate approach-avoidant tendencies. Participants (N=88) completed the mobile AAT by pulling or pushing a tablet in response to viewing appetitive dessert images and aversive disgust images. Reaction times, force exertion, and P3 amplitudes were recorded as participants executed the task. Participants were quickest when making motivationally consistent (approach) movements toward dessert images, while demonstrating the greatest force exertion during motivationally consistent (avoidant) movements toward disgust images. EEG analyses indicated stronger left-lateralized P3 amplitudes during motivationally consistent (approach) movements toward dessert images. Notably, individuals with higher impulsivity, specifically negative urgency & (lack of) premeditation, exhibited faster reaction times and larger left-lateralized P3 amplitudes when approaching dessert images. Impulsivity enhanced both neural and behavioral responses to appetitive stimuli. These findings deepen our understanding of how impulsive traits influence motivationally relevant responses, with important implications for disorders associated with dysregulated reward processing.
FUNDING: German Research Foundation: Award Number-402170461.

POSTER SESSION III - 054 | EXPLORING SENSORY SENSITIVITY THROUGH PUPILLOMETRY: EVIDENCE FROM BASIC VISUAL STIMULI

Beata Pacula-Lesniak, Michał Kuniecki
Jagiellonian University

Pupil size adaptation is a well-established marker of autonomic nervous system activity that offers valuable insights into physiological correlates of both sensory and emotional processing in a nonobtrusive way. The present study investigates whether basic visual stimuli with increasing luminance can induce different autonomic responses in individuals with varying levels of sensory processing sensitivity. We used light ramps—grayscale full-screen images created in which luminance increased gradually in fixed increments, creating a transition from low to high salience. These stimuli were designed to isolate luminance-driven responses while minimizing cognitive load and distraction. We have tested 105 participants (55 women). To display the stimuli, we used an HTC Vive Pro headset with a dedicated 200Hz Pupil Labs eye-tracking system to record the pupil size. Results showed that individuals with high sensory processing sensitivity scores have significantly weaker pupillary constriction in response to high-luminance displays compared to those with lower sensitivity. This attenuated adaptive response suggests a modulation of parasympathetic activity and potentially reduced autonomic adaptability under sensory load. The findings highlight the potential of pupillometry as a non-invasive tool for assessing individual differences in sensory processing and contribute to a growing body of research on the physiological correlates of neurodiversity.
FUNDING: This work was supported by the Polish National Science Centre (grant number 2021/41/N/HS6/04490).

POSTER SESSION III - 055 | AN ASSOCIATION BETWEEN FRONTAL MIDLINE THETA OSCILLATIONS AND REWARD SENSITIVITY AS INDEXED BY SPSRQ BUT NOT TRAIT BAS

Becca Roy, Helen Smith, Courtney Marsh, Craig McDonald
George Mason University

The Behavioral Inhibition System (BIS) and Behavioral Activation System (BAS) are motivational constructs theorized to regulate sensitivity to punishment, reward, and goal-directed behavior. BAS is associated with approach-related behavior in response to rewarding cues, while BIS regulates avoidance from a potential threat or conflict. Amodio et al. (2008) found that

trait BIS was positively associated with two neural correlates of action monitoring—N2 and error-related negativity (ERN)—but that there was no association between these components and trait BAS. In the present study, we reexamined these associations using a Go/No-Go task, focusing on N2, ERN and a third neural index, response-locked frontal midline (FM) theta oscillations. In addition to self-reported BIS/BAS traits, we evaluated the sensitivity to reward and punishment questionnaire (SPSRQ). In contrast to previous findings, we did not detect an association between trait BIS and the N2 or ERN (all ps >.27). Consistent with previous findings, we did not observe an association between trait BAS and ERP measures (all ps>.17). We found no relationship between SPSRQ and the N2 or ERN (all ps>.29). However, we did observe that, for incorrect No-Go responses, FM theta was negatively associated with the sensitivity to reward scale of the SPSRQ (p<.05). Our findings suggest that while there may not be a link between neural correlates of action monitoring and trait BAS, there is an association between FM theta and a different index of reward sensitivity, the SPSRQ.

POSTER SESSION III - 056 | ETHNIC IDENTIFICATION AND STRESS: EXAMINING HPA AND SAM AXIS REACTIVITY IN RESPONSE TO A DISCRIMINATION RELATED LABORATORY STRESSOR

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American Indians and Alaskan Natives (AI/AN) face persistent efforts to diminish their unique ethnic identities. Maintaining a robust ethnic identity may shield against harms related with colonization, such as ethnic discrimination. Ethnic discrimination has implications for the reactivity of key stress axes: the hypothalamic-pituitary-adrenal (HPA) and sympathetic-adrenal-medullary axes (SAM). We examined the stress-buffering effects of two facets of ethnic identification–exploration and commitment–on HPA and SAM reactivity in 303 urban AI/AN using salivary cortisol and cardiovascular markers of challenge and threat collected during a discrimination-based stressor. The biopsychosocial model of challenge and threat posits that coping with stressors like discrimination depends on whether people perceive themselves as having the resources to meet a stressor's demands. We predicted that people high in commitment would believe they have resources to cope with discrimination. We expected people high in exploration would feel threatened. Yet both exploration and commitment were both positively related with HPA reactivity, contrary to expectations that commitment would weaken the relationship between discrimination and stress. However, participants also displayed cardiovascular profiles of challenge, not threat, regardless of their levels of identity exploration and commitment. Results suggest both facets of ethnic identification play a role in coping with discrimination, and may provide insights into ways to mitigate ongoing health disparities experienced by AI/AN communities.
FUNDING: American Heart Association

POSTER SESSION III - 057 | IMPACT OF HEART RATE VARIABILITY BIOFEEDBACK ON EXECUTIVE FUNCTION IN OLDER ADULTS

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Both heart rate variability (HRV) and executive functioning (EF) decline as part of the aging process, possibly due to shared vulnerabilities in prefrontal cortex functioning as proposed by the neurovisceral model. Older adults are uniquely vulnerable to cognitive decline, and this decline may be associated with age-related reductions in HRV. HRV biofeedback (HRVB) aims to increase HRV and may indirectly bolster EF in older adults by strengthening regulatory systems involved in cognition. Therefore, we tested whether HRVB is an efficacious, accessible, non-pharmacological intervention that preserves cognitive function and supports independence in aging. In a randomized controlled trial, 59 older adults (32 Female) were assigned to a 5-week HRVB (n=26) or sham (n=27) condition. HRVB participants breathed at their resonance frequency (i.e., individual breathing rate at which heart rate and breathing have the most synchronicity), while sham participants breathed at a rate meant to reduce HRV. Executive functioning was measured with the NIH Toolbox Flanker and Paced Auditory Serial Addition Test (PASAT) scores. Participants in both the sham and treatment groups improved on executing functioning tasks from pre- to post-testing. However, there was no significant difference or interaction between the groups over time. These findings suggest that improvements were likely due to increased skill on executive functioning tasks or increased comfortability in the testing environment, rather than specific improvements due to HRVB.

POSTER SESSION III - 058 | REAL-WORLD CLASSIFICATION OF STUDENT STRESS AND FATIGUE USING WEARABLE PPG RECORDINGS

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Wearable-based affective computing offers a promising solution for monitoring and managing stress and fatigue in adolescent student populations without increasing reliance on mobile phones. This study evaluated a lightweight signal processing pipeline for real-world deployment on wearables, aimed at classifying affective states using photoplethysmography (PPG) data from Irish secondary school students. Students tested Wellby, a co-designed wearable and mobile app, for one month while

completing routine photoplethysmography (PPG) recordings and check-ins on their perceived levels of stress and fatigue. The pipeline performs denoising, fixed noise elimination, and peak detection to calculate time-domain heart rate variability (HRV) metrics. It was first evaluated in the public Wearable Stress and Affect Detection (WESAD) dataset, and maintained strong performance, achieving an average accuracy of 91.60% for stress classification. In the Wellby dataset, the adapted processing pipeline achieved an average precision of 80.99% for stress classification and 83.19% for fatigue classification using only time-domain HRV features. Furthermore, the inclusion of a signal quality metric and baseline well-being questionnaires generally improved the performance of the model based on the average precision for stress and sleep classification by 9.30% and 3.21%, respectively. These findings demonstrate the feasibility of a multimodal wearable processing pipeline to provide personalized affect detection in adolescent populations.
FUNDING: PhD program funding from the Royal College of Surgeons in Ireland and U.S. Fulbright Program.

POSTER SESSION III - 059 | EXAMINING THE ROLE OF NEGATIVE AFFECT IN ELICITING CONFLICT-MONITORING ERPS DURING A FLANKER-IAPS TASK

Amanda Holbrook, Nigar Sadigzade, Arjan Sidhu, John Shuford, Alyssa Williams, Junaina Nazneen, Peter Clayson
University of South Florida

Error-related negativity (ERN) is often enhanced in anxiety disorders, but its functional significance remains unclear. The negative affect signaling theory proposes that conflict detection prompts transient negative affect, which in turn improves cognitive control. The context of the negative attentional bias theory suggests that people with anxiety preferentially attend to negative stimuli. Taken together, this bias could exaggerate conflict cues that purportedly prompt negative affect and potentiate ERN. We hypothesized that larger late positive potential (LPP) to unpleasant images than to pleasant or neutral images would predict larger subsequent ERN. Larger ERN should also predict larger LPP to unpleasant images than to other images. We measured ERN and LPP during a flanker-IAPS paradigm in a sample of 79 undergraduates. Multilevel location-scale models were used to test hypotheses and account for the nested structure of the data. Unpleasant images elicited larger LPP responses than neutral and pleasant images did. However, no evidence was found for reciprocal effects between LPP and ERN across trials. These findings fail to support the negative affect signaling theory. An elevated ERN in anxiety may not be related to trial-by-trial increases in negative affect, but instead may reflect more stable, trait-like enhancements in performance monitoring or negative affect.

POSTER SESSION III - 060 | WHITE MATTER MICROSTRUCTURE AND COGNITIVE RECOVERY FOLLOWING COGNITIVE TRAINING IN FIRST EPISODE SCHIZOPHRENIA

Victoria Rosen[1], Caroline Diehl[1,2], Katherine Karlsgodt[1], Haley Wang[1], Morgan Bartholomew[3], Logan Andrews[4], Jessica Thoma[1], Anika Guha[5], Emily Martinez[1], Alexandra Reed[6], Kenneth Subotnik[1], Joseph Ventura[1], Keith Nuechterlein[1], Gregory A. Miller[1], Cindy Yee[1]
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Cognitive impairment is a core feature of schizophrenia (SZ) and among the strongest predictors of sustained disruptions to daily living. Responses to cognitive training (CT) vary widely across patients, resulting in a need to better characterize the neural systems involved in recovery of cognitive functioning. Given evidence that heterogeneity in clinical and cognitive functioning in SZ is associated with features of white matter (WM) microstructure, the present study evaluated the relationship between baseline WM measures (including fractional anisotropy (FA), neurite density (NDI), and orientation dispersion (ODI)) and change in cognitive functioning following a 6-month CT intervention in 26 first-episode SZ patients. Several effect sizes were notable, though not statistically significant in preliminary analyses. Relationships between cognitive change and FA and ODI had more non-trivial effect sizes than relationships involving NDI. The strongest effects involved ODI, suggesting an inverse association between baseline fiber disorganization in several key WM tracts (e.g., superior longitudinal fasciculus) and improvement in cognitive performance following CT. FA and NDI showed stronger effects in a separate subset of tracts (e.g., cingulum), indicating that features of WM microstructure may have tract-specific relevance to cognitive recovery. Results support the value of considering fiber disorganization when evaluating cognitive functioning and predicting CT treatment response in SZ.
FUNDING: This work was supported by the National Institute of Mental Health (R01 MH110544 and R01 MH110544-S1) and the UCLA Division of Graduate Education.

POSTER SESSION III - 061 | THE ROLE OF DEVELOPMENTAL PERIODS DURING THE FIRST EXPOSURE TO INTERPERSONAL TRAUMA ON FEAR REGULATION IN ADULT WOMEN

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Women are at greater risk of experiencing interpersonal trauma, associated to higher risk of post-traumatic stress disorder (PTSD). PTSD is characterized by heightened fear and difficulty regulating it. The brain regions involved in fear regulation follow distinct developmental trajectories, and exposure to severe

stress (e.g., trauma) can disrupt their maturation. Although the fear regulation deficits are well documented, individual differences persist, suggesting the influence of developmental factors. This study explores the association between the developmental period of the first interpersonal trauma (childhood/adolescence/adulthood) and fear regulation in adult women. Ninety-six women exposed to interpersonal trauma reported their first-event age, then underwent a fear learning protocol (conditioning/extinction/extinction recall) with electrodermal measurement. Women first traumatized in adolescence or adulthood showed higher electrodermal responses during extinction recall than those first exposed in childhood (Time x Developmental Periods: $F(6, 2090.05) = 7.57$, $p < .001$). The age at which the first trauma occurs influences fear regulation, possibly due to differences in the maturation of fear regulation circuits. Identifying sensitive periods could guide early interventions to reduce the risk of psychopathologies.
FUNDING: Canadian Institutes of Health Research Canada Foundation for Innovation Institut universitaire en santé mentale de Montréal Foundation Canada Research Chair

POSTER SESSION III - 062 | IMPACT OF EFFORT AND EXPECTANCY ON REWARD-RELATED NEURAL ACTIVITY AND ANHEDONIA: EVIDENCE FROM A NOVEL EFFORT & EXPECTANCY PARADIGM (EEP)

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Disruptions of effort-reward processes are observed in various psychological disorders such as depression. Anhedonia is a core symptom of depression that is characterized by impaired consummation and motivation for rewards. The P300 event-related potential, a neural correlate of cognitive and motivational functions, can been leveraged to further understand the impact of effort on reward-related processes and elucidate the neural underpinnings of anhedonia. Stimuli expectancy can also impact stimuli salience and the P300, and maybe implicated in the effort and reward dynamic. To investigate the influence of both effort and expectancy on P300 to reward feedback, we created a novel monetary reward task that included trials involving high and low effort (or waiting) that simultaneously varied expectancy (countdown compared to no countdown). A total of 82 undergraduate completed the task while EEG recorded and self-report measures. The P300 was significantly modulated by both effort and expectancy: Effort trials resulted in larger P300 compared to waiting, and P300 was larger when reward was less expectant (i.e., no countdown) compared to when reward was more expectant (i.e., countdown). Moreover, deficits in P300 were associated with heightened anhedonic symptoms only when elicited on high effort trials. Results provide evidence for effort justification theories as more unexpected and effortful conditions enhanced allocation of cognitive resources to reward. Reduced P300 related to effort expenditure may reflect disrupted processing of salient reward stimuli in anhedonia.

POSTER SESSION III - 063 | NEUROPHYSIOLOGICAL AFFECTIVE REACTIVITY CLASSIFICATION AND ITS STABILITY IN INDIVIDUALS WITH CANNABIS USE DISORDER

Brandon Schermitzler, Clarisse Nacilla, Thomas Preston, Richard Macatee
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The incentive salience model of addiction posits that drug-related stimuli become more motivationally relevant relative to natural reinforcers (e.g., food, adventure, romance) as addiction progresses. A neural measure of motivational relevance, the late positive potential (LPP), has been used to classify individuals into groups differing in motivational salience of drug vs. natural reinforcers. The present study aims to replicate these findings in a sample of individuals with Cannabis Use Disorder (CUD) and assess the stability of this classification. Individuals with moderate or severe CUD (N=42) ages 18-50 viewed sets of neutral (N), pleasant (P), unpleasant (U), and cannabis (C) images during concurrent EEG recording at 2 visits over a 1-week period. The resulting LPP amplitudes for each picture type at each visit were entered into a k-means cluster analysis. Results showed a picture type effect in the expected pattern (C and P>N) at Lab Visit 1 (LV1), $F(3,120)=39.35$, $p<.001$, and Lab Visit 2 (LV2), $F(3,111)=13.47$, $p<.001$. The k-means cluster analysis resulted in the 2 expected clusters at each lab visit, with 29 and 27 individuals, at each lab visit respectively, assigned to a cluster with higher reactivity to C compared to P and 12 and 10 individuals, respectively, assigned to a cluster with higher reactivity to P compared to C. Cluster assignments on the individual level were unstable from LV1 to LV2, ICC=.28, 95% CI [-.06,.55]. These findings suggest that these clusters may mostly reflect state-level factors rather than trait-like individual differences in CUD.
FUNDING: Auburn University Department of Psychological Sciences Small Grant

POSTER SESSION III - 064 | NEURAL NETWORK DYNAMICS IN TRANSDIAGNOSTIC REPETITIVE NEGATIVE THINKING

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Repetitive negative thinking (RNT) is a transdiagnostic process characterized by abnormalities in the temporal dynamics of thought and emotion, such as rumination and worry. RNT sustains a range of psychopathologies, highlighting the need to identify its underlying brain mechanisms. Prior research using static resting-state functional connectivity (rsFC) has revealed abnormalities in canonical neural networks, particularly the default mode network (DMN), salience, fronto-parietal, and limbic regions. However, static rsFC cannot capture how the stability or variability of these networks evolves over time— a key hypothesized feature of RNT. In this study, 58 individuals completed clinical questionnaires assessing the severity of various

RNT instances and underwent two functional MRI sessions: resting-state and RNT-induced. We applied co-activation pattern (CAP) analysis, a novel dynamic rsFC approach, to identify recurrent states of co-activation over time. For each CAP, we quantified persistence (average number of consecutive volumes associated with a CAP) and transition probabilities. A transdiagnostic RNT severity score derived from the questionnaires served as the primary outcome. Multiple regression analyses, controlling for age and sex, revealed that baseline RNT severity was predicted by persistence in CAP 2 (R^2=0.21, pFDR=0.001) and CAP 5 (R^2=0.20, pFDR=0.002) at rest—characterized by opposite patterns of DMN and limbic activation—but not during the RNT-induced state. These findings provide insights into the spatiotemporal properties of DMN and limbic network in RNT.
FUNDING: Sapienza University of Rome grant (AR223188B3133F0E).

POSTER SESSION III - 065 | MEMORY DILATION; USING PUPILLOMETRY TO STUDY THE IMPACT OF DEPRESSION AND EMOTION ON MEMORY ENCODING

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Relative to healthy controls, depressed adults often show poorer memory for positive material, and we have hypothesized that this may reflect reduced dopamine (DA) and norepinephrine (NE) release during encoding (Dillon & Pizzagalli, 2018). Because pupil dilation is sensitive to NE activity, and because NE neurons co-release DA, this hypothesis can be tested with pupillometry. Therefore, here we test the prediction that depressed individuals exhibit blunted pupil dilation when encoding positive images, reflecting reduced NE/DA release. Thirty-seven adults (15 female; age: 27±7) encoded 150 images (50 each negative, neutral, positive), during an oddball task. After a 90-minute neutral video, they completed an old/new recognition test with 300 images—150 (old) images from encoding and 150 closely matched (new) lures. Old and new images were matched on luminance, arousal, and content. Depression severity was assessed via the Beck Depression Inventory–II (BDI-II; Beck et al., 1996); the impact of depression was investigated using BDI-II as a continuous measure. Memory accuracy, assessed by d', was higher for positive and negative images vs. neutral images. Unexpectedly, depression was not associated with poorer memory for positive images. However, as hypothesized, depressed adults showed weaker pupil dilation to positive, but not neutral or negative, images at encoding ($p<.001$). We are currently examining pupillary responses at retrieval, to provide a more comprehensive understanding of memory-related effects of depression.
FUNDING: NIMH grants to Drs. Diego Pizzagalli (P50 MH119467), Arkadiy Maksimovskiy (K01MH122672) and Daniel Dillon (R01MH111676)

POSTER SESSION III - 066 | DISTINGUISHING NEURAL CORRELATES OF INTOLERANCE OF UNCERTAINTY AND ANXIETY

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Intolerance of uncertainty (IU) is a transdiagnostic risk factor across the internalizing psychopathologies, including anxiety disorders. Previous research found associations between error-related negativity (ERN), late positive potential (LPP), stimulus preceding negativity (SPN), and IU; similar associations were found between those event-related potentials and self-reported anxiety scores. Considering the high correlation between IU and anxiety, we aimed to disentangle the neural markers of these constructs. While EEG was recording, N = 30 undergraduates completed the classic Flanker task and Cued Picture Viewing task, where the first stimulus, "O", "-", or "?", indicated the emotion valence of the subsequent stimulus, positive, negative, or unknown, respectively. Participants also completed self-report measures of IU, anxiety, and depression. The effect of response accuracy on ERN was quantified as the difference in potentials following correct and incorrect trials. The effect of cue type on SPN and LPP was quantified as the difference in potentials following neural and uncertain cues. The cue type effect on SPN was associated only with inhibitory IU, but there were no significant correlations between the cue type effect on LPP and self-report measures. The accuracy effect on ERN was significantly associated with both measures of IU and anxiety. Multiple hierarchical regressions indicated that the correlation between IU and ERN becomes insignificant when controlling for anxiety scores. Thus, IU does not account for variance in the ERN beyond that explained by anxiety.

POSTER SESSION III - 067 | TRAIT NEGATIVE AFFECT DIFFERENTIALLY PREDICTS CUE-P3 RESPONSES TO EFFORT DEMANDS

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Effort engagement is central to motivation, and individuals high in negative affect can find effort expenditure aversive. The cue-P3 event-related potential (ERP) component increases in hard relative to easy conditions during effort-related reward processing. In an exploratory analysis using the effort-doors task, we predicted greater cue-P3-effort effects in individuals with greater self-reported negative affect. Eighty-three undergraduates completed the effort-doors task while ERPs were recorded. Model comparisons began with effort predicting cue-P3 and iteratively added self-report measures of temperament, affect, and psychopathology. As in previous studies, we found larger cue-P3 in hard relative to easy conditions. Individual differences in psychopathology and temperament moderated this effect. Higher motivation and pleasure weakened effort-related increases in cue-P3, while higher negative agentic emotionality (i.e., frustration) and negative temperament strengthened it. Frustration

and distress related to depression were linked to overall reduced cue-P3 amplitudes, but depressive distress did not interact with effort. Results supported our hypothesis. Although negative affect predicted smaller cue-P3, suggesting reduced motivational salience during the task, it predicted heightened relative motivational salience in the hard condition. These findings suggest that while negative affect is associated with signals reflecting blunted overall motivational salience, it heightens neural responses to effort demands, possibly reflecting greater aversion to hard conditions.

POSTER SESSION III - 068 | GAD SYMPTOMS AND THE TEMPORAL DYNAMICS OF ATTENTION TO THREAT

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Individuals experiencing generalized anxiety disorder (GAD) show heightened attention to threat, as suggested by greater amplitude of the late positive potential (LPP). However, traditional ERP measures do not fully capitalize on the temporal precision of EEG. Specifically, amplitude and latency do not reflect the rate of change in the LPP over a window of interest, which may be important to understanding how threat affects attention dynamics in individuals with GAD. The current study leveraged multilevel models to examine rates of LPP change (i.e., slopes) in relation to GAD symptoms. Participants (N = 105) passively viewed blocks consisting of threat or neutral images during EEG recording. Participant level LPP slopes were estimated using multilevel models, and the extracted slopes were assessed alongside mean amplitudes as concurrent predictors of GAD symptoms. LPP slopes were reliable and weakly correlated with mean amplitudes, suggesting slopes captured an attentional process distinct from mean amplitudes. In an early window of the LPP, more positive LPP slope and mean amplitude in response to threat explained three times as much variance in GAD symptoms as mean amplitude did alone. During a later window of the LPP (700-2000 ms), more negative LPP slope responses to threat were also related to GAD symptomology. Sensitivity analyses ruled out several possible confounds. Our data are the first to suggest that LPP slopes are uniquely related to GAD symptoms. Our data further suggest that LPP slopes are unique measures of attention that warrant further investigation.

POSTER SESSION III - 069 | GASTRIC MYOELECTRICAL ASSOCIATIONS WITH AUTONOMIC AND CENTRAL NERVOUS SYSTEM ACTIVITY DURING STATE NEGATIVE EMOTIONALITY AND PERSEVERATIVE NEGATIVE THINKING: A TWO-STUDY INVESTIGATION

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Despite a connection between gastric symptoms and distress clinically, little research has connected gastric activity to other biological correlates of distress. Negative emotionality and perseverative negative thinking (PNT) are two components that underlie distress. We present results from two studies examining the impact of negative emotionality and PNT on gastric activity, autonomic and central nervous systems, and inflammation. In Study 1 (N = 95), we recorded electrogastrogram (EGG), respiratory sinus arrythmia (RSA), and alpha/beta band electroencephalogram (EEG) power at baseline and during fear/sadness inductions. In Study 2 (N = 30), we recorded EGG, RSA, and EEG at baseline and during worry/rumination inductions; inflammation was collected post-inductions. In Study 1, multilevel models revealed that normogastria, RSA, and alpha power decreased (ds > -.64), whereas EGG cycle length and variability increased (ds > .70) during fear/sadness compared to baseline. Significant relationships during fear/sadness also emerged. In Study 2, t-tests revealed that normogastria and RSA decreased (ds > -.93), whereas EGG cycle length increased (d = .85) during rumination compared to baseline. Further, greater EGG cycle variability was associated with higher RSA during worry ($r = .65$, $p = .03$) and greater EGG cycle length and variability during rumination was associated with higher CRP and TNF-α composite scores post-inductions (rs > .60, ps < .05). These findings offer insight into how negative emotionality and PNT might relate to gastric and related processes.

POSTER SESSION III - 070 | SAVORING REDUCES THE ELECTROCORTICAL PROCESSING OF SUBSEQUENTLY PRESENTED NEGATIVE PICTURES, BUT WORRY ATTENUATES THIS EFFECT

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Positive emotion up-regulation increases positive emotion and the late positive potential (LPP) to positive pictures. Knowing whether positive emotion up-regulation acutely affects response to subsequently presented negative stimuli would increase understanding of whether it could buttress against upcoming negative events. Nonetheless, for individuals high in worry, a beneficial effect of positive emotion up-regulation on subsequent negative emotion might run counter to attempts to maintain negative emotion. Here, we investigated whether savoring would affect electrocortical and subjective response to subsequently presented negative and neutral stimuli, and whether worry would moderate this effect. On each trial, participants (N = 36; 24 female) savored or viewed a positive picture, which was followed by a negative or neutral picture. Participants were asked to simply view the second picture and rate its emotional valence, while EEG was recorded. Results showed that negative pictures presented immediately after participants had savored (> viewed) a positive picture elicited smaller LPPs, $F(1, 34) = 10.81$, $p = .002$, but this effect was attenuated for those higher in worry [$F(1, 34) = 7.51$, $p = .010$; $r = .51$, $p = .001$]. Savoring did not affect valence ratings of negative pictures ($p = .671$), and worry did not modulate savoring of positive pictures ($p = .757$). Therefore, savoring may reduce attention to subsequent negative events, but not for individuals higher in worry, potentially because a function of worry is to avoid emotional shifts.

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POSTER SESSION III - 071 | INDIVIDUAL DIFFERENCES IN THE IMPACT OF ROMANTIC EVALUATIONS: EVIDENCE FROM EVENT-RELATED BRAIN POTENTIALS, HEART RATE AND SUBJECTIVE EXPERIENCE

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People differ in how they process romantic evaluations: some individuals become depressed or aggressive after romantic rejection, whereas others remain calm and move on. We studied individual differences in an online dating setting and tested associations with depressive symptoms as well as differences between males and females. Heterosexual, single, and healthy participants (n = 105; 33 males, 72 females) passively viewed romantic evaluations of themselves and of potential partners on a screen. Romantic match stimuli, where both the participant and the potential partner wanted to go on a date with each other, were associated with enhanced P3 amplitudes and higher reward ratings. Romantic rejection stimuli, where the participant wanted to go on a date but the potential partner declined, were associated with enhanced cardiac deceleration and higher pain ratings. Contrary to our expectations, males reported overall higher pain and reward, showed higher P3 amplitudes, but exhibited less cardiac deceleration. Higher levels of depression were associated with higher pain and reward ratings, and higher P3 amplitudes, but no association with cardiac deceleration was found. These findings contradict theories suggesting that males are less sensitive to romantic and social evaluations, and that subclinical depression is associated with blunted reward processing. Follow-up research is needed to specify under which precise circumstances depressive symptoms and gender are associated with altered psychophysiological and subjective responses to potentially rewarding and/or painful stimuli.

POSTER SESSION III - 072 | ACADEMIC STRESS MODERATES THE RELATIONSHIP BETWEEN A BLUNTED ERROR-RELATED NEGATIVITY AND INCREASES IN ALCOHOL CONSUMPTION ACROSS THE FIRST YEAR OF UNIVERSITY

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The transition to university is often marked by higher academic demands and greater alcohol use, which can adversely impact students' well-being. While alcohol use is common in university, not all students increase their consumption, and the factors driving individual trajectories are understudied. One risk factor for problematic use is the error-related negativity (ERN), a neural response to errors, which appears blunted in those with alcohol use disorder. The ERN is also associated with risk for problematic use, suggesting it is a viable vulnerability marker for increases in consumption. Yet, few studies have examined whether the ERN prospectively predicts increases in consumption, or if this diathesis interacts with stress to predict increases. The present study examined how academic stress and the ERN interact to predict increases in consumption across the first year of university, controlling for pre-university consumption. In their first month, 148 first-year students (78% female) reported on their alcohol use and completed the Flanker task while an electroencephalogram was recorded to elicit the ERN. We then tracked participants across their first year. Results indicate that academic stress interacts with the ERN to predict increases in consumption. At high academic stress levels, a blunted ERN predicted increases in consumption across the year. These findings suggest that the ERN may act as a neural risk marker for alcohol misuse and highlights the need to consider both neural and environmental factors in identifying those most vulnerable to alcohol-related issues.

POSTER SESSION III - 073 | DISSECTING ANXIETY: EVIDENCE FOR A DISTINCT FREEZING-RELATED DIMENSION

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Research has identified at least two transdiagnostic dimensions of anxiety, anxious apprehension and anxious arousal, that are related but still distinct. These do not fully represent anxiety symptoms; freezing is another widely recognized reaction to threat, but limited work examines how it relates to other dimensions of anxiety, especially in mundane, anxiety-inducing contexts. This study evaluated the unique variance in heart rate variability (HRV; operationalized by high frequency (HF) power as a measure of parasympathetic activity during freezing) accounted for by anxious apprehension (PSWQ), anxious arousal (MASQ-AA), and anxious freezing (AFQ: a new self-report scale with three moderately correlated factors) in undergraduates (N = 46) who did arithmetic problems with performance-based social evaluation (MIST) while wearing a cardiac monitor. Hierarchical linear modeling examined unique variance in HF power accounted for by each dimension of anxiety. Results revealed moderate correlations among PSWQ, MASQ-AA, and AFQ scores (0.67 > all r's > 0.46) and strong correlations among AFQ factors (0.90 > all r's > 0.83). Two of three AFQ factors, cognitive freezing and evaluative threat, accounted for significant unique variance in HF power during the MIST evaluative (stress) session. Results indicate moderately strong relationships between anxious freezing and other transdiagnostic dimensions of anxiety, while confirming associations with unique physiological correlates. Findings support the importance of considering anxious freezing as a dimension of anxiety.

POSTER SESSION III - 074 | TRUSTING HEARTS: INDIVIDUAL HEART RATE VARIABILITY AND DYADIC COUPLING IN A TRUST GAME

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Background: While prior research has focused on intra-individual HRV, interpersonal heart rate variability (HRV)

synchronization has emerged as a promising physiological marker of social interaction. This study investigates dynamic HRV coupling between dyads engaged in a trust-based economic interaction. Methods: Thirty dyads (N = 60; 15 men; M = 23.52 years, SD = 6.71) participated in the Investment Game (IG) in two conditions: remote and face-to-face. During the remote phase, participants completed two remote IG rounds before taking part in a laboratory session including physical separation, an initial in-person meeting, a passive shared baseline, two face-to-face IG rounds, and perceived synchronization ratings. HRV data were continuously recorded via Polar H10 sensors and analyzed using cross-wavelet power to assess physiological synchronization with a high time- and frequency-resolution. Results: HRV synchronization was low during separation, increased significantly upon face-to-face encounter, and remained stable during passive co-presence. Synchronization rose during interactive IG tasks and peaked during subjective synchronization ratings. Conclusion: These findings suggest that while proximity enables HRV coupling, it is not the sole driver. Instead, social engagement dynamically modulates synchronization processes. Future analyses aim to clarify how individual HRV patterns contribute to the emergence, strength, and flexibility of physiological synchronization during social interaction.
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POSTER SESSION III - 075 | EXPLORING ABNORMAL NEURAL SENSITIVITY TO REWARDS IN FMR1 PREMUTATION CARRIERS ACROSS MULTIPLE TASKS

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Women with the premutation of the FMR1 gene (55-200 CGG repeats) are at high risk for depression. Examining this phenotype can inform etiological models that explain how the premutation confers increased risk for depression. We recently demonstrated that women with the FMR1 premutation have a blunted RewP compared to controls on a simple guessing task (Doors). In the same cohort, we had data available for a performance-based reward task (Monetary Incentive Delay, or MID). We tested whether carriers demonstrate a general blunting of reward sensitivity (i.e., across both tasks) or if this blunting was task-specific. Data were analyzed from 16 adult female FMR1 premutation carriers and 15 age-matched controls. Participants completed both tasks while the EEG was recorded. The RewP was scored at electrodes Fz and Cz for each task and for each group. The ANOVA yielded a significant three-way interaction between task (Doors, MID), feedback (Win, Loss), and group (carriers, controls), $F(1,28)=8.739$, $p=.006$. Follow-up t-tests used the RewP difference score (Win minus Loss) for each task. On the Doors task, RewP amplitude differed between groups ($t(29)=2.312$, $p=0.028$, $d=0.831$). On the MID task, RewP amplitude was similar across groups ($t(29)=.856$, $p=.399$, $d=.308$). Overall, preliminary analyses suggest that blunting of reward sensitivity in FMR1 premutation carriers is task-specific. Notably, the premutation carriers demonstrated increased parietal involvement in the RewP elicited by the MID task. We plan to explore this topographical difference between groups.
FUNDING: Purdue University

POSTER SESSION III - 076 | "RESTING" BRAIN AND DYNAMIC THOUGHTS: A RESTING-STATE EEG STUDY

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Resting-state electroencephalography (rsEEG) has been used extensively to study cognition, emotion, and psychopathologies like depression, often by estimations of oscillatory activity. Such methods assume that the "resting" brain reflects passive, intrinsic neural activity. Yet, participants report variable thought experiences during periods of rest, highlighting the importance of understanding if and how variability in thoughts impact rsEEG metrics. Participants (n=95; 100% female; 32.5±4.2 years) reported depression symptoms, completed a 3-minute eyes-closed rsEEG, and reported their thought content during rest. Absolute and relative power in the delta, theta, alpha, and beta frequency bands in regions of maximal power amplitude were calculated. Participants endorsed more self-related thoughts (M=2.52, SD=0.75) than thoughts about others (M=2.19, SD=0.86), planning thoughts (M=2.04, SD=0.82), or rapid thoughts (M=2.08, SD=0.97; $F(3, 282)=8.61$, $p<.001$). A series of exploratory correlations between thought content domains, absolute and relative power in each frequency band, and depression symptoms revealed a significant positive association between planning thoughts and absolute alpha power ($r=-.22$, $p=.035$) and between planning thoughts and relative theta power ($r=.21$, $p=.045$). Additionally, depression score was positively associated with rapid thoughts ($r=.30$, $p=.003$). Results suggest that dynamic thought experiences during periods of "rest" may at least partially account for variability in rsEEG and associations with psychopathology.
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POSTER SESSION III - 077 | EVIDENCE OF ALTERED INTER-NETWORK CONNECTIVITY IN FIRST-EPISODE SCHIZOPHRENIA AND ITS ASSOCIATION WITH COGNITIVE PERFORMANCE

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Schizophrenia (SZ) is associated with cognitive impairment as early as the clinical high risk and first-episode (FE) phases of illness. However, consensus is lacking on associated aberrant brain network connectivity and how it relates to cognitive performance. Impediments to progress may include a) reliance on a unitary model of lateral frontoparietal network (L-FPN), a neural network integral to executive functioning, and b) the limited temporal resolution of fMRI, the method typically used in such studies. Based on research distinguishing two L-FPN

subnetworks that display opposite coupling to default mode network (DMN) and dorsal attention network (DAN) respectively, the present study utilized resting-state EEG oscillatory source analysis to evaluate L-FPNA and L-FPNB subnetworks. We sought to determine: 1) how FE SZ differ from healthy comparison (HC) subjects in L-FPN inter- and intra-network functional connectivity, and 2) how this relates to cognitive performance. Initial results from a subsample of participants revealed that FE SZ (n=12) displayed less alpha-band connectivity between L-FPNB and DMN than HC (n=12) ($p = 0.03$; marginally significant after correcting for multiple comparisons). Connectivity correlated positively with working memory and verbal learning performance among FE SZ ($p = 0.02$; n.s. after controlling for multiple comparisons) but not HC. These findings suggest altered inter-network L-FPN connectivity present in the initial phase of schizophrenia that may play a role in reduced cognitive performance.
FUNDING: This work was supported by the National Institute of Mental Health (R01 MH110544 and R01 MH110544-S1) and the UCLA Division of Graduate Education.

POSTER SESSION III - 078 | REDUCED PREFRONTAL DELTA OSCILLATIONS UNDERLIE IMPAIRED APPROACH BEHAVIOR IN SOCIAL ANXIETY DISORDER

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Social anxiety disorder (SAD) is characterized by elevated social avoidance and reduced social approach, yet the underlying neural mechanisms remain poorly understood. One promising candidate is delta-frequency (1–4 Hz) neural oscillations in the prefrontal cortex, which increase during cognitive tasks that require overriding automatic responses. To examine the role of delta oscillations in social approach-avoidance behavior, SAD patients (N=32) and healthy controls (HCs; N=26) completed a novel Social Judgment Approach-Avoidance Task. In this task, participants judged which of two faces appeared happier or angrier and used two joysticks to approach or avoid the selected face as quickly as possible. High-density EEG was recorded to assess neural oscillatory activity during congruent and incongruent trials. Behaviorally, SAD patients showed reduced accuracy when approaching angry faces (incongruent) and increased accuracy when approaching happy faces (congruent) compared to HCs. Spectral analysis revealed decreased prefrontal delta power when approaching happy versus angry faces across groups. Critically, in the SAD group, social anxiety symptoms were negatively correlated with delta power modulation, indicating that greater symptom severity was associated with reduced delta engagement during approach to threat. These findings suggest that delta oscillations support adaptive approach behavior, and that blunted delta activity may underlie impaired social engagement in SAD. Delta oscillations may represent a viable target for intervention via non-invasive brain stimulation.
FUNDING: NIMH (R00MH126161)

POSTER SESSION III - 079 | MODULATION OF THE LATE POSITIVE POTENTIAL BY PERSONAL PREFERENCES FOR PLEASANT EXPERIENCES: AN EXAMINATION OF EFFECTS OF DEPRESSIVE SYMPTOMS AND BRIEF INTERVENTION

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The late positive potential (LPP) is a robust neural marker of attention towards emotionally salient stimuli, yet it is unknown whether the LPP is modulated by personal preferences for specific types of pleasant objects/experiences. The present study aimed to (1) evaluate the impact of personal preferences on the LPP to pleasant images, and (2) assess clinical implications of personal preference-related modulations of the LPP by testing effects of depressive symptoms and a brief positive emotion-focused intervention. College students (N=92; Mage=19.44, SD=1.15) reported depressive symptoms before randomization to the intervention (n=47) or study skills comparison group (n=45). Participants then rank-ordered a list of positive objects/experiences (e.g., animals, adventure, social activities) based on which they enjoyed most, and then viewed images of each while EEG data were recorded. The LPP was modulated by personal preferences, such that LPP to images depicting top-ranked pleasant objects/experiences was enhanced compared to low-ranked ($d=0.27$, $p=.02$). Depression significantly impacted LPP modulation by personal preferences ($p=.048$), such that greater depressive symptoms were associated with less differentiation in the LPP based on personal preference ($r=-.23$). The intervention did not significantly change LPP modulation by personal preference ($p=.29$). Results highlight the utility of considering personal salience in clinical neuroscience tasks and indicate that depression may be characterized by difficulty sustaining attention to personally salient pleasant experiences.
FUNDING: This study was supported in part by UL1 TR000445 from the National Center for Advancing Translational Science (NCATS)/National Institute of Health (NIH).

POSTER SESSION III - 081 | EARLY PERCEPTUAL PROCESSING OF EMOTIONAL FACES IS NOT IMPACTED BY EMOTIONAL PROSODY PRIMES

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Faces and voices are some of the most salient sources of information for identifying the emotions of others. However, little research has focused on how emotional prosody modulates the earliest stages of face perception at the neural level and results are mixed. We investigated priming effects of emotional prosody on the processing time course of facial expressions using ERPs. Auditory prosodic primes (spoken sentences filtered to remove semantic information) expressing happy, neutral, or angry emotions were presented and immediately followed by a face expressing a congruent or incongruent emotion. After each trial, participants were asked to rate the face on valence and arousal. ERPs time-locked to face presentation were analyzed at all time points and electrodes using data-driven mass

univariate statistics. Preliminary results (N=36, target N=60) revealed a significant main effect of face emotion spanning the N170, P2 and early EPN components and a significant main effect of voice emotion from ~50-100ms and 300-400ms. Critically, these factors did not interact, suggesting that auditory contextual information has no clear influence on the early perceptual processing of facial expressions, regardless of emotional congruency. Behavioural results also supported this conclusion as emotional prosodic primes did not show a clear interaction with face emotion for valence or arousal ratings. Thus, prosody primes influence visual processing before and after facial expressions are decoded, but do not modulate face emotion processing.
FUNDING: NSERC

POSTER SESSION III - 082 | INDIVIDUAL DIFFERENCES IN AFFECTIVE AND PHYSIOLOGICAL RESPONSES TO EXPERIENTIAL UNCERTAINTY

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Individual differences in people's tolerance for uncertainty are associated with mental health and well-being. However, much of the literature on responses to uncertainty has relied on retrospective self-report measures of how one believes they tend to act in uncertain contexts or has inferred how people feel about uncertainty based on their behavior in decision-making tasks. Here, across two studies, we introduce a novel experiential uncertainty task in which participants are asked to insert their hands into an opaque box and feel an unknown object. We assessed their physiological and subjective experience during an anticipatory period immediately before the start of the task. We also measured participants' self-reported intolerance of uncertainty (IU) using a standardized questionnaire. In both Study 1 (N=149) and Study 2 (N=173), we found that individuals who self-reported higher IU also exhibited greater parasympathetic withdrawal during the experiential uncertainty task, as indexed by larger decreases in respiratory sinus arrhythmia. Individuals higher in IU also self-reported more negative emotions (e.g., worry, nervousness) in anticipation of completing the task in Study 2. Findings suggest that IU is associated with heightened physiological arousal and negative emotion during even relatively mundane experiences of uncertainty, and suggest that these affective responses may contribute to the development and maintenance of IU as well as its role in mood disorder symptomology.

POSTER SESSION III - 083 | INTEROCEPTIVE PHASE COUPLING OF DIVERGENT MOVEMENTS AND STIMULUS ONSET

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Breathing has been shown to synchronise with stimulus presentation and voluntary action, yet its relationship to stimulus timing and variation across action types remains unclear. We investigated respiratory phase effects on action initiation and stimulus presentation in two experiments. In Experiment 1, 32 participants performed a Libet clock task while respiratory flow was recorded under the right nostril. In voluntary trials, they pressed a key at will during a rotating dot's cycle; in cued trials, they pressed upon the dot's appearance. Respiratory phase was estimated via Hilbert transform. Hodges-Ajne omnibus tests on 1,000 surrogate datasets revealed significant clustering around exhalation for voluntary key presses and dot presentations ($p = .032$), but no clustering in the cued condition ($ps = .647$). In Experiment 2, the same participants executed spontaneous push and pull movements with a joystick at 8-12 s intervals. Both push and pull movements clustered around exhalation ($p = .001$); Moore's test found no phase difference between actions ($R = .731$, $p = .216$). Exploratory analyses showed that individual phase coupling strength correlated positively with respiratory rate and variability. These findings suggest that exhalation is a general facilitatory phase for coordinating perception and action, potentially reflecting default mode network (DMN)-mediated integration of internal and external rhythms. Future work should investigate the underlying neural mechanisms and individual differences.
FUNDING: Nagoya University Joint Research Fund Grant No. 1921420474

POSTER SESSION III - 084 | EMOTION CATEGORIZATION IN ALEXITHYMIA: THE ROLE OF PERCEPTUAL AND FUNCTIONAL SIMILARITY

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Alexithymia is a personality trait characterized by difficulty in recognizing and verbalizing one's own emotions. Previous studies suggest that the ability to categorize emotions relies on detecting functional similarities beyond perceptual features (Barrett, 2017). This study investigated whether individuals with high alexithymia prioritize perceptual similarities over functional ones. 25 participants (19 female; mean age = 22.1, SD = 2.13) completed the measures of alexithymia, depression, anxiety, and autistic traits, and the similarity judgment task. This task consists of three conditions: arousal similarity condition, valence similarity condition, and color similarity condition. In each trial, participants selected which of two emotional words was more similar to a target word based on that specific dimension of similarity (arousal, valence, and color), including interference stimulus. Measures included number of errors (NoE), reaction times (RT), and maximum deviations (MD), which is an index of attitudinal conflict. Results showed alexithymia were negatively correlated with the difference in NoE and RT between valence-color similarity conditions with arousal as the interfering stimulus ($ps < 0.05$). Furthermore, alexithymia was positively correlated with the difference in MD between arousal-valence similarity conditions with color as the interfering stimulus ($p < 0.05$). These findings suggest that individuals with higher alexithymia tend to rely more on perceptual than functional similarities.
FUNDING: JST SPRING JSPS

POSTER SESSION III - 085 | TESTING CAUSAL RELATIONS BETWEEN BEHAVIORAL AND PHYSIOLOGICAL DYNAMICS DURING INTERPERSONAL COORDINATION

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We addressed temporal coordination between individuals in the joint task of music-making, measured in dyads' auditory-motor synchronization and their physiological synchronization. 62 musically trained adults' respiratory and cardiac signals were compared in dyadic melody perception, melody synchronization, and resting (silent) baseline tasks. Synchronization trials introduced perturbations to disrupt partners' auditory feedback (behavioral synchronization) or to disrupt their respiratory rhythms (physiological synchronization), to assess directional effects of perturbations at one level (behavioral or physiological) on the other level. Results showed that dyadic respiratory and cardiac synchrony increased significantly during joint production compared to perception or baseline tasks. Respiratory perturbations caused the most disruption to partners' behavioral synchrony. Auditory perturbations disrupted partners' behavioral synchrony but not their respiratory synchrony. Individual differences also affected behavioral and physiological synchronization: partners with similar individual spontaneous production rates achieved better dyadic behavioral synchrony, and partners with similar resting heart rates achieved greater dyadic cardiac coupling during synchronization tasks. These findings suggest that entrainment occurs between behavioral and physiological levels and highlight the importance of dyadic differences in interpersonal coordination.
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POSTER SESSION III - 087 | RESONANCE-PACED BREATHING MODULATES NEUROCARDIAC SIGNALING AND ALCOHOL CUE REACTIVITY

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Rutgers University

Automatic motivational responses toward alcohol cues often undermine conscious attempts to regulate drinking behavior. Recent proof-of-concept studies have identified the cardiovascular system as a potential target for modulating neural processes that sustain cue salience, with preliminary evidence suggesting greater effects among females. However, few studies have directly manipulated the cardiovascular system to examine effects on alcohol cue reactivity (ACR) or sex differences in these pathways. Resonance-paced breathing (RPB) is a brief intervention involving slow rhythmic breathing at 0.1Hz (6 breaths-minute) that engages bottom-up afferent signaling via the central autonomic network, theoretically blunting cue reactivity. 79 young adults (20±2 years; 57 females) who reported binge drinking within the past month completed two experimental sessions: RPB and a low-demand cognitive task. Each session included ECG and EEG recording and an alcohol cue-reactivity Oddball (OB) task. 0.1Hz HRV spectral power was extracted from the ECG and the stimulus-locked alcohol cue P3 (ACR-P3) was isolated. A linear mixed model tested effects of Condition, Sex, and within-person change in 0.1Hz HRV on ACR-P3 amplitude. Greater within-person increases in 0.1Hz HRV were associated with attenuated ACR-P3 amplitudes, $B=-1.8$, $p<.01$, an effect particularly pronounced among females, $B=-2.3$, $p<.01$. These findings suggest that RPB modulates alcohol cue reactivity via neurocardiac pathways and underscores sex-specific considerations for interventions targeting autonomic regulation.
FUNDING: R21AA029604

POSTER SESSION III - 088 | THE RELATIONSHIP BETWEEN WELL-BEING AT SCHOOL AND HAIR CORTISOL CONCENTRATIONS IN YOUTH

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Social well-being, defined as the ability to form meaningful relationships, is crucial for mental health. School plays a key role in its development for youth. Girls typically report higher social well-being than boys. According to the stress buffering hypothesis, well-being mitigates the negative effects of stress, including its physiological manifestations, which could be assessed by cortisol, a stress hormone. While a negative relationship between psychological well-being and basal salivary cortisol has been observed in adults, few studies have examined this relationship using hair cortisol concentrations (HCC), which reflects cumulative levels rather than short-term fluctuations. We investigated the moderating effect of sex on the relationship between school well-being and HCC in youth. Forty-eight children (32 girls) aged 9 to 14, completed the Kidscreen-27 and provided a hair sample. Results revealed a well-being x sex interaction ($F(3,44) = 3.67$, $p = 0.02$), with a negative relationship between well-being and HCC only observed in girls ($\beta = -0.49$, $p < 0.001$). These results underline the importance of considering sex differences when studying school well-being and physiological stress.
FUNDING: Centre de recherche de l'Institut universitaire en santé mentale de Montréal.

POSTER SESSION III - 090 | THE IMPACT OF MATERNAL TRAUMA ON CHILDREN'S OBSERVATIONAL FEAR LEARNING

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Interpersonal trauma, which disproportionately affects women, is often associated with post-traumatic stress disorder (PTSD) symptoms, such as heightened and dysregulated fear responses. These impacts can extend beyond the victims, increasing the

risk of PTSD and other psychopathologies in their children. Observational fear learning within the mother-child dyad has been proposed as a mechanism underlying this heightened risk. Given that girls typically exhibit stronger fear responses than boys, the child's sex must be considered. This study examines how maternal trauma influences children's observational fear learning. The sample includes 141 children (70 boys), aged 8 to 12, grouped by maternal trauma exposure (n = 78) or no exposure (n = 63). Children observed their mother and a stranger during a fear conditioning protocol, in which one color was paired with a shock for the mother (CS+M), another for the stranger (CS+S), and a third with no shock (CS-). Stimuli were later presented to the children without shocks; first trials measured fear acquisition and final trials assessed fear extinction through skin conductance response (SCR). A Stimulus*Group*Sex interaction was found [$F(2, 620.35) = 3.60$, $p = .028$], with girls in the trauma group showing higher SCRs to the CS+M compared to controls during fear acquisition ($p = .03$). These results highlight the role of learning mechanisms in the intergenerational transmission of fear and the importance of considering sex differences.
FUNDING: Canadian Institutes of Health Research (CIHR) Canada Foundation for Innovation (CFI) Institut universitaire en santé mentale de Montréal Foundation Canada Research Chair in Hormonal Modulation of Cognitive and Emotional Functions

POSTER SESSION III - 091 | PSYCHOLOGICAL COSTS OF DISTRACTION ACROSS SEX: ETHNIC DIFFERENCES BY HRV

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Studies show that avoidant coping may affect health and well-being differentially by ethnicity and sex. We examined whether ethnicity and heart rate variability (HRV), an autonomic balance index, moderated the distraction coping (CopeD)–stress link across sex. 765 college students (57% women; Mean age = 19.5 [1.6]) completed surveys and 10-min resting high-frequency HRV (log-HF). Asians (n = 152) had lower HF than Whites (n = 443; r = -.05 [-0.13, 0.03]) and Hispanics (n = 170; r = -.08 [-0.19, 0.03]). A 3-way interaction model controlling for waist circumference showed distinct race- and sex-based patterns in the positive CopeD–stress link across HF levels. The strength of the association declined with higher HF in Hispanic women (low: r = .24 [0.04, 0.43]; mean: r = .21 [0.01, 0.41]; high: r = .05 [−0.15, 0.25]) and White men (low: r = .20 [0.06, 0.35]; mean: r = .21 [0.07, 0.35]; high: r = .11 [−0.03, 0.26]), but remained stable in Asian women (rs: .12 to .18) and Hispanic men (rs : .05 to .07). In contrast, the positive CopeD-stress link was weakest at low HF and strongest at higher HF for White women (low: r = .13 [0.00, 0.25]; mean: r = .26 [0.13, 0.38]; high: r = .24 [0.12, 0.36]) and Asian men (low: r = .04 [−0.21, 0.27]; mean: r = .20 [−0.03, 0.43]; high: r = .21 [−0.02, 0.45]). Complex ethnic differences by HRV interactions suggest that the psychological costs of distraction coping may be contingent on joint cultural and physiological contexts. Implications will be discussed.

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POSTER SESSION III - 092 | SALIENCE AND PROBLEMATIC ALCOHOL INVOLVEMENT: SPECIFYING SEXUAL DIMORPHISM IN COGNITIVE RISK FACTORS

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University of Iowa

Problematic alcohol involvement (PAI) poses a massive burden to society. Dual-pathway models of PAI posit contributions from cognitive mechanisms of both control (e.g., disinhibition; Dis) and incentive salience (e.g., reward responsivity). However, existing research utilizing ERPs indicates associations between PAI and reward responsivity may vary as a function of biological sex and trait disinhibition. Relatedly, peer perceptions (Peer) have been shown to mediate associations between disinhibition and PAI, but only for women. Here, we aim to further clarify these relations. Adolescents and young adults (N = 253, 68% female, aged 14-21), recruited from a large midwestern university and surrounding community, reported on their alcohol-related behavior, problems, and peer influences before completing ERP assessments. Average P3 amplitudes elicited by alcohol vs. non-alcohol beverage images were derived from a picture-rater task to index alcohol cue reactivity (ACR-P3). We analyzed moderators (i.e., disinhibition, peer drinking perceptions, sex) of the ACRP3 as it relates to alcohol-related problems via multiple regression. Among the reliable effects was an ACR-P3 x Sex x Peer x Dis interaction, $Z = -2.02$, $p = .043$, as well as an ACR-P3 x Peer x Dis interaction, $Z = 2.19$, $p = .029$. Conclusion: Our findings suggest variability in how ACRP3 confers risk for PAI, including sexual dimorphism. Replications and extensions of the present analysis would be critical in further characterizing the observed interaction effects.
FUNDING: NIH 1R01AA030728

POSTER SESSION III - 093 | TIMING MATTERS: THE IMPACTS OF CIRCADIAN RHYTHM ON DARK ENHANCED STARTLE

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Oregon State University

The circadian rhythm critically contributes to the regulation of sleep and wake cycles. Mismatch of an individual's circadian rhythm with their external environment (i.e., the earth's 24-hour light-dark cycle) can lead to deleterious effects such as heightened stress. Assessment of circadian rhythm alignment primarily relies on self-report, leaving questions about the precise mechanisms associated with increased stress seen during states of mismatch. Validated physiological measures of stress responding such as startle potentiation promise to address this. The present study (N=128) assesses the acoustic general startle

reactivity (GSR) and dark enhanced startle (DES) of participants categorized into chronotypes (morning, intermediate, and night; based on circadian rhythm) using the reduced composite score of morningness (rCSM) questionnaire. Since all participants were assessed at an intermediate time of day, intermediate participants were considered matched while the morning and evening chronotype participants were mismatched. While no significant difference in GSR between chronotypes was found, mismatched chronotypes exhibited significantly greater DES than matched indicating increased activation of stress related neurocircuits rather than baseline differences in reactivity. These results show the potential to better assess the mechanisms involved in the effects of circadian rhythm mismatch using psychophysiological methods. Further investigation can include additional measures while focusing on matching other chronotypes (e.g., morning and evening) to assessment time.

POSTER SESSION III - 094 | DOES COGNITIVE TRAINING INFLUENCE NEURAL SPEECH PROCESSING AND HEARING REHABILITATION AFTER COCHLEAR IMPLANT SURGERY?

Annika Rackl, Isabella Thurner, Josef Seebacher, Philipp Zelger, Markus Rungger, Sophia Lodes, Christian Gstrein, Sonja Rossi
Medical University of Innsbruck

Cochlear implants (CIs) are an effective way to restore hearing and improve speech intelligibility in patients with severe hearing loss. A link between cognitive abilities and hearing may partly explain the still wide variability in speech comprehension outcomes after CI treatment. This project aims to examine the neural processing of semantics and the potential impact of a cognitive training after CI surgery. The study involves two groups of CI recipients. All patients undergo hearing training as part of the clinical routine. One group receives hearing tasks, while the other group is instructed to train their cognitive abilities using an app. Six months after CI activation, we recorded electroencephalography (EEG) while participants listened to sentences that were either semantically correct or incorrect. We conducted event-related potential (ERP) analyses to investigate fast neural processes. Preliminary results suggest an early and more positive ERP response for semantically incorrect compared to correct sentences in both groups. This could be indicative of a P300 component, which reflects an attentional response. Patients using the cognitive training app show a trend towards a delayed onset of the N400 for semantically incorrect sentences, which may indicate that semantic processing is already more efficient after six months of cognitive training. Our preliminary findings suggest that there are alterations in the neural processing of semantics in CI users compared to normal hearing individuals, and that cognitive training influences these alterations.
FUNDING: partially funded by MED-EL Elektromedizinische Geräte GmbH

POSTER SESSION III - 095 | REVERSAL LEARNING IN THE PUPIL AND VISUAL BRAIN

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University of Florida

In a dynamic naturalistic environment, it is advantageous to adjust behavior as needed when situations change. Reversal learning is used to study the formation and inhibition of learned associations. This study utilized an aversive reversal learning task to study the effects of aversive reversal learning on changes in pupil dilation and visuocortical responses, in particular the steady-state visual evoked potential (ssVEP). During each trial of the initial acquisition phase, participants (N=52) viewed one of two flickering Gabor patches differing in orientation. An unpleasant loud noise (US) often co-terminated with one of these Gabor patches (CS1) while the other Gabor patch served as a safety cue (CS2). During the reversal phase, the contingencies were switched, such that the CS2 was paired with the US while the CS1 became the safety cue. Test phases, occurring before and after the reversal, superimposed either the flickering CS1 or CS2 over a neutral flickering Gabor patch, such that attentional biases could be quantified based on competition effects. As expected, subjective ratings and pupil dilation responses provided evidence of acquisition and reversal learning. Visuocortical steady-state responses exhibited a stable bias toward the CS1 in parieto-occipital channels during both test phases, while this bias shifted toward the CS2 in lateral occipital channels during the post-reversal test phase. These results demonstrate that learned biases are retained in some visual processing areas despite contrary changes in peripheral and motor activity.
FUNDING: This research was supported by NIH grant R01MH125615 to Andreas Keil, PhD.

POSTER SESSION III - 096 | MISMATCHED EXPECTATIONS : COMPLEX INTERPLAY BETWEEN SOCIETAL EXPECTATIONS FALSE INDIVIDUAL FEEDBACK PHYSIOLOGY DUR COMPETITION

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Success in competitive environments hinges on complex psychological and social dynamics. In these contexts, performance can be disrupted when there is a mismatch between societal expectations and individual feedback competitors receive. This study examined how social identity-based expectations shape physiological stress responses in a math competition. Participants were randomly assigned to receive either negative or positive individual-level feedback, creating personal expectations of high/low performance on the upcoming task. To manipulate social expectations (i.e., based on social identity), competitions occurred in a same-sex, interracial dyad where one person belonged to a member of a racial group positively stereotyped in the mathematics domain (i.e., Asians) and the other was not (i.e., Whites). Asian participants exhibited greater sympathetic arousal, as evidenced by larger decreases in pre-ejection period

(PEP), during both preparation and competition phases compared to White participants, suggesting heightened engagement in the competition task. Regardless of race, negative feedback elicited stronger physiological threat reactivity during anticipation than positive feedback. Exploratory analyses examined moderation of effects by stress appraisals, group identification, and achievement goals. This study highlights the complex interplay between expectations, identity, and stress in competitive environments, providing insights into how psychological factors influence physiological outcomes.

POSTER SESSION III - 097 | A STOIC TRAINING INTERVENTION'S EFFECT ON PSYCHOPHYSIOLOGY DURING A SOCIAL STRESS TASK

Ashylia Sloane, Sijian He, Nicole Moncada, Yunwen Wang, Shanbairong Nie, McQueen Li, Michael Lewis
Hamilton College

Stoicism is frequently mischaracterized as emotional suppression. However, its emphasis on focusing on what one can control closely aligns with key principles of modern psychology. Recent literature has introduced Stoic Training for Achieving Resilience (STAR) as an 8-day intervention that uses daily journaling on Stoic principles to promote positive emotion regulation. These studies have fallen short by neglecting to examine physiological markers that could substantiate their findings. This study expanded on this novel research by applying STAR training to an undergraduate population and examining the training's potential effect on heart rate (HR), heart rate variability (HRV), and skin conductance (SC) during a Trier Social Stress Test (TSST). 111 undergraduates were randomly assigned to the active control or STAR intervention condition. After completing the training, participants were asked to visit the lab. They gave a speech defending their qualifications for a dream job to an unreactive confederate panel, followed by a mental arithmetic task involving serial subtraction, all while believing they were being recorded. Physiological data were recorded throughout the lab visit. We used a mixed model ANOVA to analyze physiological measures across groups and time, followed by pairwise t-tests for significant effects. Initial results indicate that STAR participants exhibited higher HRV at baseline and lower increases in skin conductance levels during their speech preparation. Data analysis is ongoing and will become more accurate as our sample size increases.
FUNDING: Hamilton College Psychology Department

POSTER SESSION III - 098 | THE AUTONOMIC EFFECTS OF UNILATERAL LEFT-HAND CONTRACTIONS: A HEART RATE VARIABILITY INVESTIGATION

Murat Sükuti[1], Yuta Kimura[1], Ryuto Inoyama[1], Yasuyoshi Kinta[2], Hiroaki Masaki[1]
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Unilateral left-hand contractions (LHC) increase contralateral cortical activity during motor tasks, followed by decreased activity post-LHC. However, autonomic responses to LHC are underexplored. This study used heart rate variability (HRV) to examine LHC's effects on parasympathetic activity. The HRV analysis presented here is part of a larger multimodal study. Twenty-four participants completed two counterbalanced sessions on separate days. In the LHC condition, a jelly beverage in a pouch with spout was consumed by squeezing it using only the left hand (60 sec). In the control condition, the same beverage was consumed via straw from a cup (60–90 sec). A 12-min spatial Stroop task (SST) was conducted following both conditions. Resting-state HRV (3 min) was recorded while seated with hands on lap at three time points: before the beverage consumption (Rest1), immediately after consumption (Rest2), and after the SST (Rest3). The primary HRV parameters (RMSSD, pNN50, LF, and HF) were calculated. A 2×3 RM-ANOVA showed a significant main effect of time for all parameters ($p < .001$), a significant interaction for pNN50 ($p = .023$, $\eta p2 = .15$), with a trend for RMSSD ($p = .062$, $\eta p2 = .12$). HRV parameters increased more from Rest1 to Rest2 in the LHC condition. These findings suggest that LHC enhances short-term parasympathetic recovery as a compensatory rebound, consistent with models of hemispheric asymmetry in autonomic control. Even brief, unilateral motor tasks may elicit measurable, transient parasympathetic effects with implications for stress regulation and performance.
FUNDING: Morinaga & Co., Ltd. Grant

POSTER SESSION III - 099 | THE PSYCHOPHYSIOLOGICAL EFFECTS OF A KOMBUCHA INTERVENTION TO THE MAASTRICHT ACUTE STRESS TEST

Alexander Taylor[1], Courtney Davies[1], Alina Warren-Walker[1], Kyriaki Remoundou[1], Jose Carli[1], Mark Pavey[2], Robert Nash[3], Amanda Lloyd[1], Nigel Holt[1]
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Kombucha, a fermented tea beverage containing probiotics and bioactive compounds, has been associated with various health benefits, including the potential to have stress-reducing benefits. The study examined whether 8-week Kombucha consumption modulates physiological and subjective stress responses during the Maastricht Acute Stress Test (MAST). In a placebo-controlled design, healthy participants (N = 40, 20-72yrs) either consumed a Kombucha or a placebo beverage daily, completing pre- and post-intervention MAST sessions. Stress and pain reactivity was measured using standard psychophysiological and/or self-report indices while controlling for individual differences. The MAST elicited a significant main effect of increased sympathetic activity response to the stressor, confirming effective stress induction. A significant time effect was observed, reflecting the dynamic nature of stress responses throughout the MAST. No significant main effect of beverage or interaction between beverage and time was found. Analysing the change between sympathetic and parasympathetic activity (change from stress to no stress) and controlling for gender, results suggest a group main effect, with the kombucha group showing the least amount of change in the autonomic nervous system, but no group by time interaction. The MAST effectively provoked the desired stress responses. While change in autonomic nervous activity was reduced in individuals in the Kombucha group (pre

and post intervention). These findings do not support a stress regulation role for Kombucha under laboratory conditions.
FUNDING: Innovate UK: Better Food for All: Innovation for improved nutrition, early-stage. Funding Number 10074259.

POSTER SESSION III - 100 | REDUCED STIMULUS PRECEDING NEGATIVITY DURING PERIODS OF UNCERTAIN ANTICIPATION IS LINKED TO HIGHER LEVELS OF DEPRESSIVE SYMPTOMS

Benjamin Troutman, Ava Turino, Meghan Benincasa, Haley Gaboury, Lin Fang, Josh Carlson
Northern Michigan University

Depression has been linked to blunted anticipation of emotional events; particularly those with expected rewarding outcomes. Symptoms of anxiety and stress often coincide with depression; however, they tend to be associated with exaggerated anticipation of emotionally negative outcomes. The stimulus preceding negativity (SPN) is an event-related potential (ERP) that measures anticipatory brain activity, which has been linked to depressive and anxious symptoms.This study aimed to better understand the relationship between each affective symptom and SPN after considering the comorbidity of the other two affective symptoms. To assess this aim, we collected self-reported levels of depression, anxiety, and stress as well as the SPN during the anticipation of uncertain outcomes using 256-channel EEG. Data from participants (n = 43; 22% female) was analyzed in a series of partial correlations where the SPN was correlated individually with depression, anxiety, or stress while controlling for the other two symptoms. Results suggest a positive association between the SPN and depression while controlling for stress and anxiety. On the other hand, the correlations of the SPN with anxiety and stress (while controlling for the other affective symptoms) were negative, but did not reach statistical significance. Thus, our results suggest a blunted anticipation of uncertain outcomes in individuals with higher levels of depression.
FUNDING: NSF 2320091

POSTER SESSION III - 102 | THE ODD ONE OUT – HOW DOES DIFFERENCE OF OPINION MANIFEST ON THE PHYSIOLOGICAL LEVEL?

Nina Volkmer[1], Jessica M. Wetzel[1], Stella Wienhold[1], Bernadette Denk[1], Maria Meier[1,2], Raphaela J. Gaertner[1], Elea Klink[1], Wolfgang Gaissmaier[1], Jens C. Pruessner[1]
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Background: While social pressures and conformity have been extensively studied on the behavioral level, accompanying physiological effects are less elucidated. The current study investigates the impact of dissent on cortisol release and physiological synchrony. Methods: 50 participants took part in a conformity paradigm. They were prescreened regarding their opinions across several sociopolitical topics and then allocated into groups of 4-5, with all but one member sharing the same opinion on a specific matter. Participants publicly positioned themselves on the topic, defended their stance, participated in a group discussion and again stated their opinion publicly. A continuous electrocardiogram recording and four saliva samples for cortisol analysis were taken. A novel analysis method drawing upon cross-wavelet power was used to explore heart rate variability (HRV) synchrony across different ranges within the high frequency (HF) spectrum. Results: Endocrine analyses showed no significant differences in cortisol release between in- and outgroup participants. For HRV synchrony, we observed frequency range dependent differential effects. While greater opinion difference was linked to higher synchrony in the lower, greater cortisol reactivity was linked to lower post-interactional synchrony in the upper HF range. Discussion: Dissent is accompanied by distinct physiological patterns. Synchrony dynamics appear frequency range specific, whereby cross-wavelet power allows for more fine-grained analyses. Possible mediators like attention and regulatory processes will be explored.
FUNDING: Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC 2117 – 422037984

POSTER SESSION III - 103 | ASSESSING PSYCHOLOGICAL STRESS DURING PHYSIOLOGICAL AND COGNITIVE TASKS USING fNIRS

Kailey Wheeler
Thompson Rivers University

Memory retrieval tasks are commonly used to assess cognitive decline associated with aging, but anxiety can impair performance. To account for this, questionnaires are traditionally used to assess state anxiety, however they may lack temporal precision. Physiological measurements to capture sympathetic activation offer a more reliable approach. In our study we explored the feasibility of using the Artinis Brite fNIRS system to simultaneously monitor brain activity and acute stress via entropy derived values from pulsatile changes in the signal. Fifteen healthy young adults completed two physiological (cold pressor test, isometric handgrip) and two cognitive (unsolvable anagram, color–shape interference) stressors while fNIRS, blood pressure, and heart rate were monitored continuously. Entropy-based metrics— Average Sample Entropy and Total Sample Entropy— were extracted from both fNIRS and arterial blood pressure signals before task and during the task. Mean arterial pressure increased significantly during all four tasks ($p = 0.005$) suggesting sympathetic activation. fNIRS entropy values (AvgSampEn and TotalSampEn) significantly increased whilst completing all four tasks ($p = 0.023$, $p = 0.036$), with no task × time interactions ($p > 0.05$). Blood pressure entropy metrics varied by task. These findings support using fNIRS-based entropy to non-invasively estimate sympathetic activation during both physiological and cognitive stress. Uniform increases in fNIRS entropy suggest generalized sympathetic effects on cerebral perfusion, while peripheral responses varied by task.

POSTER SESSION III - 104 | PHYSIOLOGICAL EVIDENCE FOR IMPLICIT RIGHT-HEMISPHERE DOMINANCE IN CHIMERIC EMOTIONAL FACE PERCEPTION

Takahiro Osumi, Nazuna Iseri
Chiba University

This study investigated the role of implicit information processing in the perception of emotional expressions in chimeric faces, which are constructed by combining an emotional expression on one side with a neutral expression on the other. The right-hemisphere dominance hypothesis of emotional processing is supported by findings that chimeric faces with emotional expressions on the left side (from the observer's view) are perceived as more intense than those on the right. To explore whether this effect occurs without conscious awareness, the study subliminally presented chimeric faces showing either happy or angry expressions and measured participants' skin conductance responses (SCRs) as an index of physiological arousal. Subjective ratings of emotional intensity and valence showed no significant differences across face types, thereby confirming the effectiveness of the subliminal presentation procedure. Notably, SCRs were significantly greater for chimeric faces with emotional expressions on the left side than on the right, but only among male participants. These findings suggest that implicit perceptual processes contribute to the lateralized perception of emotional expressions in faces, consistent with the right-hemisphere dominance hypothesis, and further indicate that this hemispheric asymmetry may be specific to males.
FUNDING: JSPS KAKENHI Grant Number JP23K02909

POSTER SESSION III - 105 | PUPILLOMETRIC EXAMINATION OF THE ROLE OF ATTENTIONAL RESOURCES IN DISTRACTION BY CHANGING-STATE IRRELEVANT SOUND

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This study tested an attentional-based account of the disruptive effect of changing-state sound on short-term memory. Normally observed in the context of visual serial recall, the changing-state effect (CSE) cannot be found under the missing-item task. The attentional account of auditory distraction posits that changing-state sound requires high processing demands that draw attentional resources away from the ongoing task. This account ascribes the insensitivity of the missing-item task to changing-state sound distraction to its decreased dependence on attentional resources relative to serial recall. To test this assertion, pupillometry was used as a tool to measure cognitive processing: higher demands cause the pupils to dilate. By comparing the missing-item task to the CSE-sensitive probe task, Experiment 1 revealed that the CSE was restricted to the probe task even though pupils were larger in the missing-item task. Experiment 2 showed that increasing processing demands in the missing-item task enlarged pupil size, but failed to reveal the CSE. In both experiments, pupil size was similar for changing-state and steady-state sound. Overall, the present results revealed no relationship between processing demands (as indexed by pupillometry) and the CSE. Such findings are incompatible with the view that changing-state sound causes distraction because it recruits attentional resources at the expense of ongoing mental activity. An interpretation of the CSE in terms of interference-by-process should be favored.
FUNDING: Natural Sciences and Engineering Research Council of Canada (RGPIN-05626-2020) Canada Foundation for Innovation

POSTER SESSION III - 106 | THE INTERPLAY OF SEMANTIC SUBCATEGORY, TIME COURSE, AND ELECTRODE LOCATION ON THE LATE POSITIVE POTENTIAL

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The Late Positive Potential (LPP) is an event related component that has been indicated as a measure of sustained attention, with increased response to emotionally evocative stimuli. Previous work has demonstrated that the time course of the LPP is affected not only by overall valence and arousal, but also by semantic subcategories of stimuli – most notably erotic, affiliative, threat, and mutilation themed images. However, differences in the time courses and scalp topographies of the LPP to these particular subcategories have not been fully examined, and its interaction with electrode placement is unclear. The current study used an existing dataset from 43 healthy adult females who engaged in a passive viewing task consisting of pleasant (erotic and affiliative), neutral, and negative (threat and mutilation) images. Preliminary analyses tested the interaction between time window (400-600, 600-800, and 800-1000 ms), electrode location (Fz, Cz, and Pz), and semantic subcategories on LPP amplitude. The ANOVA yielded a 3-way interaction, $F(6.199) = 3.725$, $p = 0.01$). This interaction indicates that the shift in LPP in topography over time varied as a function of semantic category. Planned follow-up contrasts will explore the unique LPP morphology within each semantic category. In the future, we aim to examine how these spatiotemporal patterns are influenced by individual differences in emotional reactivity.
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