

## The University of Toronto Scarborough Psychology and Neuroscience Departmental Students' Association (PNDA) 2024 Academic Research Panel



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### Abstract:

The Psychology and Neuroscience Departmental Students' Association (PNDA) advocates on behalf of its members to the Department of Psychology at the University of Toronto Scarborough Campus and fosters academic excellence and career growth. PNDA provides academic and professional support by creating opportunities to interact and network with like-minded individuals while serving as a hub for all matters pertaining to Psychology, Mental Health studies, and Neuroscience programs, thereby connecting members, students, faculty, staff, organizations, institutions, companies, and communities. The Academic Research Panel (ARP) is an annual event focused on fostering research and student engagement amongst UTSC students specifically in the psychology, neuroscience, and mental health studies programs. Each year the ARP is led by undergraduate students from PNDA providing students with a platform to network and showcase their scientific work. This booklet is composed of abstracts from the presenting undergraduate students.

**Keywords:** neuroscience; psychology; mental health; social psychology; social identities; cultural differences

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### Conference Abstracts

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### **Effect of Early-Life Stress on Depression and Anxiety-Like Behaviour in Adolescent Mice**

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Infancy is a crucial developmental phase during which early experiences profoundly shape future cognitive abilities, emotional regulation, and behaviours. Early life stress (ELS), stemming from adverse experiences like maltreatment, abuse, and parental neglect, is believed to disrupt crucial brain development during this sensitive period. ELS has been associated with increased rates and severity of depression and anxiety in adolescents (Favoretto et al., 2023; Shin & Lee, 2023; Spinhoven et al., 2010; Heim et al., 2008; Phillips et al., 2005; Kessler et al., 2001). Despite this, the brain circuitry underlying vulnerability to adolescent anxiety and depression is not fully understood. Research shows that brain regions like the prefrontal cortex and hippocampus, projecting to the nucleus accumbens, form a circuit modulating anxiety and depression behaviors (Muir et al., 2020; Bagot et al., 2015). These brain areas undergo significant structural and anatomical changes during adolescence. As such, we hypothesize that ELS increases susceptibility to depression and anxiety in adolescence by altering the developmental trajectory of these brain circuits during infancy.

To model ELS, we use a mouse model of maternal deprivation (Miragaia et al., 2018), which involves isolating 11-day-old mouse pups (human equivalent to infancy) from their mother for 24 hours. Anxiety- and depression-like behaviours are assessed between postnatal days 35-40 (human equivalent to adolescence) using validated behavioural tests, including the Elevated Plus Maze, Open Field Test, Tail Suspension Test, and Forced Swim Test. Through these methods, we aim to observe and quantify behavioural and brain region-specific alterations in mice exposed to ELS compared to their non-stressed counterparts. These results will highlight and inform the effects of stress on increasing susceptibility to the lifelong risk of mental health disorders.

Our preliminary behavioural data suggest that ELS increases depression- and anxiety-like behaviours in mice during adolescence. The main findings and conclusions, supported by rigorous statistical analyses, will be presented at the Forum. Our results have direct implications for improving early interventions targeting mental health issues originating in early life and highlighting the trajectory of the onset of anxiety and depression.

### **Pathways to Fulfilment: Attention and Awareness**

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Discovering unconscious motivations has long been the modus operandi of psychotherapy. Whether called a maladaptation, a complex, or incongruence—psychotherapy aims to encourage self-exploration and self-insight. In a rationalistic paradigm, it is understandable why an intellectual awareness of our unconscious should give us the means to conquer our thoughts and emotions. However, it appears that knowing our unconscious motivations is not enough to reconcile inner conflicts and live fulfilling lives. Instead, the rise of mindfulness, somatic, expressive arts, and psychedelic-assisted therapies reveals a drive to offer individuals transcendental, life-changing experiences that go beyond a rationalization of the unconscious.

Interestingly, recent research suggests that symbolic exploration of the unconscious using imagination is a crucial component for self-assessment, redefinition, and transformation of one's self, goals, and motivations. This symbolic interaction with one's unconscious has been found to occur in aesthetic experiences—from listening to music that resonates deeply, to being profoundly moved by a character or scene in a movie. Further, research indicates that our connection to stories can define the foundations and rationale for identity and social roles. Thus, our relationship with stories and perceived symbolism in aesthetic experiences appear to be fundamental to both the development and maintenance of the self and its healing and transformation.

This literature review proposes that transcendental experiences play a critical, universal role in healing and self-actualization. Through a cross-cultural analysis, this paper aims to explore transcendental experiences and examine whether they hold a universal value for psychological healing across different cultures. By reviewing studies from North America, South and West Asia, and the United Kingdom, this research seeks an improved understanding of the phenomenon of transcendence in psychological healing, with implications for informing perceptions of the psychotherapeutic process.

### **Addressing Social Anxiety in Adolescents Who Stutter: A Comparison of In-Person and Online Cognitive-Behavioral Therapy Interventions**

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Stuttering, a speech disorder characterized by non-fluent speech patterns, can persist from childhood to adulthood, significantly impacting social interactions and mental well-being. Individuals who stutter often face social challenges, such as disruptions in academic performance, difficulties in interpersonal relationships due to fear of judgment or embarrassment, and avoidance of careers requiring strong public speaking skills. Social anxiety disorder is particularly prevalent among this population. Despite the established link between stuttering and anxiety, research on interventions for adolescents who stutter, especially comparing in-person versus online cognitive-behavioral therapy (CBT), is limited. This study aims to address this gap by conducting a two-year randomized clinical trial comparing the effectiveness of in-person versus online CBT interventions in reducing social anxiety among adolescents aged 12 to 17 who stutter. Participants will be randomly assigned to receive either in-person or online CBT sessions, with data collection including baseline surveys and self-report questionnaires on social anxiety symptoms and perceptions of stuttering severity. Statistical analyses, including t-tests and multiple linear regression, will be used to compare intervention effectiveness while controlling for relevant variables such as age, gender, ethnicity, parental socioeconomic status, parental education levels, previous therapy experience, and multilingualism/bilingualism. The study aims to provide valuable insights into the most effective therapeutic modality for addressing social anxiety in adolescents who stutter, bridging a critical gap in mental health research and speech-language pathology. This research is particularly relevant given the increased delivery of services through online platforms, driven further by the COVID-19 pandemic and society's immersion in technology more than ever. This underscores the urgent need to determine whether therapy delivered online is inferior, superior, or equally effective compared to therapy delivered in-person.

### **Understanding the Behavioral and Neural Mechanisms of Tail-Elicited Tail Withdrawal Reflex in Aplysia**

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Habituation of the tail-elicited escape swim response in *Aplysia* is an important phenomenon that helps with understanding the mechanisms of learning and memory in this marine mollusk. Through a comprehensive literature review and computational modeling using MATLAB, this study explores the neural circuits involved in the habituation process and how the habituation of the escape swim response influences learning and memory. By examining the plasticity of neural connections and the modulation of neurotransmitters, this study describes the mechanisms of habituation in *Aplysia*. The findings suggest that habituation of the escape swim response not only reflects adaptive changes in the neural circuitry but also contributes to the formation of memory traces that shape future behavioral responses. By using computational models and neurobiological theories, this research provides a better understanding of how habituation influences learning processes and memory consolidation in *Aplysia*. Overall, this study can help with understanding the significance of habituation in shaping behavioral responses and its implications for the broader framework of learning and memory mechanisms. Further research on habituation in *Aplysia* can focus on long-term memory retention and retrieval. Understanding the neural mechanisms involved in habituation in *Aplysia* could have implications for treating memory-related disorders in humans. By developing therapies based on findings of research on *Aplysia*, researchers may improve memory formation and retrieval in individuals with cognitive impairments. In conclusion, research on habituation in *Aplysia* has the potential to advance our understanding of memory mechanisms and offer new medications and therapies for memory-related disorders.

### **The Influence of Prosody in Tonal Language on Social Interpretation Between Autistic and Allistic Individuals**

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Research indicates that autistic individuals exhibit lower proficiency on linguistic tasks involving pitch differentiation, compared to allistic people. Pitch is crucial in communicating emotions through language, specifically in tonal languages where pitch influences the meaning and emotions of words. This study investigates the differences in pitch perception between autistic and allistic individuals and how this affects their emotional speech perception in tonal or non-tonal languages. Autistic and allistic individuals with native proficiency in Cantonese (tonal) or English (non-tonal) will be recruited. This study adopts a procedure from existing literature, presenting participants two variations of the same words

expressed with different emotions. Both groups will identify the emotion and tone of words in the tonal-speaking group (one of Cantonese's 9 tones) and intonation in the non-tonal speaking group (question versus statement). It is expected that autistic individuals will face greater challenges than allistic individuals in interpreting emotions in speech and signs of difficulty will be more pronounced in tonal language speakers. Results can clarify speech perception differences between autistic and allistic individuals in tonal and non-tonal languages. It also provides foundational insights to innovate tonal language learning support and enhance emotional speech perception of tonal languages for autistic individuals.

### **Investigating First-Generation East Asian Immigrant Parental Influence on Their Second-Generation Children's Mental Health Service Usage and Mental Wellbeing**

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In recent decades, there has been an influx of East Asian immigrants migrating to Western countries, with a subsequent growth in second-generation immigrant populations. However, in terms of mental health care access, there appears to be a lack of use. This study aims to investigate the role of family in this situation. The struggles involved with immigration deeply affects both parents and their children. Immigrants can feel a lack of connection to those outside of the immediate circle, which can lead to greater reliance on one another. Consequently, if the bond is shaken, conflict and decreased mental wellbeing can occur to both parties. Second-generation immigrants have more immediate family stressors as well due to struggles of balancing acculturation and enculturation. Thus, having greater family cohesion and balance of acculturation seems to lead to better outcomes. This study aims to answer the research question of how much, as well as how does, first-generation East Asian immigrant parents influence their second-generation East Asian immigrant children in their mental wellbeing and mental health service usage? It is hypothesized that reduced mental health service barriers and greater mental wellbeing for second-generation East Asian immigrant youth are positively associated with increased acculturation of first-generation parents, increased successful integration of a bicultural identity in second-generation youths, and greater family cohesion. Data for each independent variable (acculturation in first-generation parents, bicultural identity in second-generation youths, and overall family cohesion rated by both parties) as well as each dependent variable (mental health service access and mental wellbeing) will be measured by using questionnaires. Interviews with participants will also be conducted. Correlational and thematic analyses will be conducted. The results of this research can inspire new interventions that help East Asian immigrant youths reach mental health services, encouraging new ways of finding greater family cohesion and familial relationship satisfaction.

### **Vaping and Mental Health Burden Among Youth**

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This comprehensive study examines the emerging problem of vaping among Canadian adolescents, with a particular focus on its epidemiology, public health interventions, and mental health consequences. With the growing popularity of vaping, especially among teenagers, there is a notable rise in apprehension regarding its potential health hazards, such as chronic illnesses and premature mortality. This report critically examines data obtained from significant surveys such as the Canadian Student Tobacco, Alcohol, and Drugs Survey, providing insights into concerning patterns and identifying the specific demographic group that is most vulnerable: adolescents between the ages of 15 and 17. Although epidemiological methods have made significant progress, the long-term health consequences of vaping are still largely uncertain, highlighting the need for additional research and improved surveillance mechanisms.

### **Infant Enculturation to Music Melody**

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During early infancy, children become particularly capable at perceiving language sounds, faces, and musical patterns that were common in their everyday interactions (Maurer & Werker, 2014). This phenomenon is referred to as enculturation – the process through which individuals acquire specific knowledge about socially meaningful patterns through perceptual experiences. Enculturation to musical systems allows us to effortlessly clap, dance, and sing with members of our community, which can be socially and emotionally powerful experiences. Using a preferential listening paradigm hosted over Zoom, this study explores whether 12-month-old infants have acquired culture-specific musical expectations about pitch



sequences and are able to differentiate between musical tunes that are either predictable or unpredictable given Western musical systems. On each of 16 trials, infants will see an eye-catching visual stimulus and hear a melody. The melody will play for 30 seconds or until the researcher, who cannot hear the music themselves, indicates with a key press that the infant has glanced away from the screen for 2 seconds. Looking times across conditions will serve as a measure of the infants' relative interest in the melodies. Both researcher and parent wear masking headphones, ensuring that the infant's behaviour is reflective of their own interest. Data regarding the infants' prior musical exposure is collected by parent-report using a questionnaire completed prior to the study. We hypothesize that 12-month-old infants are able to differentiate between predictable and unpredictable melodies, with infants who are most exposed to Western music more readily differentiating. Results from this study will contribute to our current understanding of how culture-specific pitch knowledge is acquired in infancy, as well as the role exposure plays in infant perception.

### **The Accented Brain: An EEG Study on Speaker Variability**

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During speech perception, listeners must identify speech sounds and comprehend the linguistic message despite significant variation caused by non-linguistic cues (e.g. gender, age). The current study investigates the neurophysiological representation and processing of speech sounds, in particular speaker identity and accent processing. Adapted from a paradigm developed by Scharinger et al. (2011), the Mismatch Negativity (MMN) component of EEG is used as a change detection response to characterize accent processing during speech perception. In a passive listening task, participants were auditorily presented the token *stopped* spoken by different speakers, in either Standard Canadian English (SE) or Mandarin Chinese accented English (CE). In each block, one accent served as a frequently repeating "standard," and the other as an infrequent "deviant." We aim to determine a) whether accents are detected in the early stages of phonetic processing, b) if there is an effect, whether it is modulated by familiarity with the accent, and c) whether accent can be extracted across different speakers. It was hypothesized that accent variation is detected in the MMN component and can be extracted across different speakers. Specifically, that there will be a larger amplitude in an earlier time window if the deviant accent is familiar to the listener, and a larger amplitude in a later time window if the accent is unfamiliar. Level of familiarity with the presented accent is expected to dampen the effect. Preliminary results of average EEG waveforms indicate that listeners can extract across multiple talkers presumably categorizing by accent, as reflected in a late MMN response. Interestingly, L1 Mandarin speakers do not show the expected behaviour, suggesting that they are not familiar with their own accent. Thus, bottom-up acoustic information is paired with top-down knowledge to form a complete picture of speaker identity and linguistic message.

### **The Maximization of Exposure Therapy**

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Phobias have been proven to be the catalyst of anxiety, depression, post-traumatic stresses, and mental health disorders, illustrating the importance of further research required to maximize the effectiveness of phobia treatment. Previous researchers explored the different categories of therapy that serve as a medical treatment to help patients confront their fears, in addition, exposure therapy has been identified as the most effective form of medical treatment for phobias. Exposure therapy, a psychological treatment whose purpose is to advocate a positive emotional and physiological state. The diverse sorts of presentation treatments incorporate heart rate variability (HRV) biofeedback, vivo reality, virtual reality presentation treatment, and numerous more. Numerous restorative organizations joined HRV biofeedback and virtual reality exposure therapy to presentation treatment, in any case, no investigation has utilized music to make strides in the productivity of presentation treatment. The disclosure of these past ponders spurred the inquiry to examine the degree to which music impacts the adequacy of vivo reality introduction treatment to patients with katsaridaphobia, the fear of cockroaches. The technique apparatuses utilized to conduct the inquire includes: Fear of Cockroaches Questionnaire (FCQ), expert-reviewed vivo reality exposure therapy, heart rate monitor (HRM), and a correlational content analysis of the influence of the different categories of music on the patients' heart rate as displayed on the HRM. The results revealed that cheerful music induces positive emotions but heightened arousal, sad music leads to a catatonic emotional state but stable physiology, and scary music elicits negative emotions and heightened arousal. While cognitive behavior therapy, which incorporates such interventions, can be effective in promoting mental health, its success depends on participant cooperation and acceptance of diagnosis. The study suggests that music, acting as an antidepressant in exposure therapy, influences fear responses through varied neurotransmitter releases, impacting both cognition and physiology, though further research is needed to establish definitive effects.

### **Decoding Fluoxetine: Unveiling Its Mechanisms and Clinical Impact as an SSRI Pioneer**

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Fluoxetine, a pioneering selective serotonin reuptake inhibitor (SSRI), has revolutionized the treatment landscape for major depressive disorder (MDD) since its development in the early 1970s. This literature review delves into fluoxetine's historical evolution, pharmacokinetics, pharmacodynamics, behavioral effects, side effects, tolerance, sensitization, and withdrawal considerations. The review highlights fluoxetine's pivotal role as a first-line therapy for MDD and its efficacy in treating other conditions like eating disorders, narcolepsy, and even clinical deterioration associated with COVID-19. Compared to its counterparts, fluoxetine demonstrates a relatively lower clinical trial discontinuation rate, suggesting a potential tolerability advantage. Additionally, its antidepressant effectiveness matches tricyclic antidepressants (TCAs) while exhibiting fewer side effects due to its selective profile.

### **Investigating Impulsivity as a Mediator in the Relationship Between Early Life TBIs and Substance Use Problems in Young Adulthood**

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Traumatic brain injuries (TBIs) are a major public health concern, particularly among children and adolescents, with implications for cognitive, behavioral, and emotional functioning. While previous research has highlighted the association between TBIs and adverse outcomes such as psychopathology and impaired social functioning, the role of impulsivity in mediating the relationship between childhood TBIs and subsequent substance use problems has been neglected. This study addresses this gap by investigating whether early life TBIs are associated with increased substance use problems in young adulthood and whether this relationship is mediated by facets of impulsivity. We hypothesized that individuals with a history of early life TBIs will demonstrate greater rates of substance use problems, and this relationship will be mediated by negative and positive urgency specifically. Participants (N = 435) aged 18-29 were recruited using an online platform and completed self-report measures assessing childhood TBIs, impulsivity, and substance use problems. The OSU-TBI Identification method was utilized to assess TBI history, while the Short UPPS-P Impulsive Behavior Scale measured impulsivity. Substance use problems were evaluated using the AUDIT, DAST-10, and B-YAACQ. Mediation analyses were conducted to examine the indirect effects impulsivity in the relationship between early life TBIs and substance use problems. Participants with early life TBIs (N = 163) exhibited significantly higher scores on measures of alcohol-related consequences (YAACQ, AUDIT) compared to controls. Mediation analyses revealed that positive urgency partially mediated the relationship between early life TBIs and alcohol-related consequences. However, no other mediating effects were demonstrated. Future studies employing longitudinal designs and behavioral measures of impulsivity are warranted. Our findings underscore the enduring impact of early life TBIs on alcohol-related outcomes in young adulthood.

### **Range Adaptation in Decision-Making and Its Correlation with Symptoms of Major Depressive Disorder and Schizophrenia**

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Subjective evaluation of a stimulus can vary greatly among different individuals, or even within the same person at different time points. For instance, a neutral stimulus is often considered rewarding after experiencing a punishment. This context-dependent processing of information is called range adaptation. In this research, we verified the existence of range adaptation during decision making, demonstrating a significantly lower evaluation (bid) of food after adaptation to a series of high-value food, and a significantly higher evaluation (bid) of food after adaptation to a series of low-value food. Besides, we discovered differences in the adaptation magnitude but not adaptation speed among individuals. Given the discovery from previous research that depression and schizophrenia patients have decision-making related impairment, we hypothesized that the individual difference in range adaptation may also correlate with one's mental health. The result of quantitative analysis of the correlation is insignificant, whereas the exploratory questions which represent adaptation behavior correlates with depression and schizophrenia symptoms.

### **Cross-Cultural Variations in Emotion Expression and Management**

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Today we rely on social media platforms for emotional expression and communication. According to Forbes, users have reached over 4 billion globally in 2023 and are on an upward trend. With an average of 145 minutes spent per day, Forbes reports that more than 60% of adolescents feel a negative influence on their mental health as a result of their media engagement. Social media has provided us with an almost unlimited world where people from across the globe can communicate with one another despite their differences. Culture plays an integral role in many aspects of our being, and while cultures differ in their emphasis on different aspects of self, emotional reactivity is enhanced through the activation of culturally dominant aspects of self. Additionally, there are differences identified among social perception variables between different cultures which are attributed to divergences in judgment. While previous studies suggest that there is a link between emotion, behaviour, and culture, little is known about how users from various cultural backgrounds on social media react to emotional cues. By examining the behavioural reactions of users on platform X who are from three different cultures, this study seeks to address the identified gap in our knowledge. This study compares and contrasts the patterns of sentiment, emotional involvement, and conversation across various cultural contexts. Participants are identified through self-declaration from Canada, Iran, and Germany. Given that there is a vast difference between the dominant cultures of these three countries, it is hypothesized that users will exhibit significant cross-cultural differences in their behavioural responses to both positive and negative emotional stimuli. Such differences are hypothesized to affect participants' patterns of engagement, such as sharing, liking, and replying. The findings of the study will shed light on how people from various cultural backgrounds interact with emotional material on social media.

#### **Conflicts of Interest**

The author(s) declare that they have no conflict of interest.

#### **Authors' Contributions**

LH: Served as a member of the planning committee for the conference, assisted authors with their abstract submissions.

JP: Served as a member of the planning committee for the conference, assisted authors with their abstract submissions.

IP: Served as the Chair of the Planning Committee for the conference, assisted authors with their abstract submission and gave final approval of the version to be published.

KR: Served as a member of the planning committee for the conference, drafted the abstract booklet, assisted authors with their abstract submissions and gave final approval of the version to be published.

ST: Served as a member of the planning committee for the conference, assisted authors with their abstract submissions.

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