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7th Annual Neuro Health Awareness Conference (NHAC) Abstract Book

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Abstract
The Neuro Health Awareness Conference (NHAC) is an initiative organized by the University of Ottawa Multiple Sclerosis Club (UOMSC), a student-led organization committed to raising awareness about multiple sclerosis and broader neurological health through education, advocacy, fundraising, and community engagement. UOMSC works to create opportunities for students and the wider community to learn about neurological disorders, connect with researchers and healthcare professionals, and support individuals affected by these conditions. Through events like this conference, the club aims to foster meaningful conversations around brain health, neuroscience research, patient experiences, and innovation in care. The conference brings together students, researchers, clinicians, advocates, and individuals with lived experience for a day of keynote talks, panel discussions, and networking opportunities centered on neurohealth. In addition to promoting education and dialogue, the NHAC also supports an important charitable mission, with proceeds being donated to the MS Canada and the University of Ottawa Brain and Mind Research Institute to help advance multiple sclerosis support, neurological research, and innovation in brain health. By combining awareness, collaboration, and philanthropy, the conference reflects UOMSC's dedication to making a meaningful impact both on campus and in the broader community.

Keywords: undergraduate; conference; neuroscience; psychology; multiple sclerosis

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Conference Abstracts

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Poster Presentations

Neural Transformation of Motor Memory: Shifts in Hippocampal and ACC Activity

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Learning a new motor skill like ice skating often begins as a memory-dependent process before becoming automatic through repetition and practice. Motor memory is typically classified as a non-declarative form of memory and is thought to rely primarily on cortico-striatal and cerebellar circuits rather than the hippocampus. However, declarative and non-declarative memory systems may overlap during early learning, with both a motor memory of the skill and an episodic memory of the learning experience forming concurrently. Memory consolidation involves a gradual reorganization of neural networks over time, characterized by decreasing hippocampal dependence and increasing cortical involvement. While this process is well established in episodic memory, it remains less well understood in motor memory. The present study examined whether motor memory undergoes similar systems-level reorganization by measuring neural activity in the dentate gyrus (DG), cornu ammonis 1 (CA1), and anterior cingulate cortex (ACC). Thirty C57BL/6N × 129SvEv hybrid mice (15 male, 15 female; 8–12 weeks old) were assigned to six experimental conditions varying by memory age (1 day vs. 21 days), training frequency (2 vs. 21 sessions), and context familiarity (familiar vs. novel). Mice were trained on an accelerating rotarod task, and neuronal activation was assessed using c-Fos immunohistochemistry. c-Fos–positive cells were quantified in the DG, CA1, and ACC to compare regional engagement across conditions. Results indicated that hippocampal recruitment was greater during recent and less familiar conditions, whereas ACC engagement increased following extended practice and remote testing. These findings demonstrate that motor memory undergoes systems-level reorganization influenced by time, context, and task familiarity, reflecting a transformation that parallels but remains distinct from episodic memory consolidation.

Enhancing Motor Rehabilitation in Parkinson Disease Using Prefrontal rTMS: A Randomized Control Trial Protocol

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Parkinson disease (PD) is a progressive neurodegenerative disorder characterized not only by motor impairment but also by neuropsychiatric symptoms including depression, apathy, and executive dysfunction that substantially contribute to disability and reduced quality of life (Aarsland et al., 2009; Cantone et al., 2026). Repetitive transcranial magnetic stimulation (rTMS) improves motor symptoms in PD when targeting the primary motor cortex, while high-frequency stimulation of the dorsolateral prefrontal cortex (DLPFC) shows antidepressant efficacy and guideline-supported evidence for PD-related depression (Chou et al., 2015; Lefaucheur et al., 2020). Because motor and neuropsychiatric symptoms arise from interacting cortico–basal ganglia networks, targeting prefrontal circuits may indirectly enhance motor rehabilitation by improving motivation and executive functioning. This randomized controlled pilot trial evaluates whether prefrontal neuromodulation strengthens a behavioural loop in which neuropsychiatric improvement increases participation in rehabilitation and facilitates motor recovery. Fifty individuals with Parkinson disease (Hoehn and Yahr II–III) with mild-to-moderate depressive or executive symptoms will be randomized in a double-blind design to receive active or sham high-frequency rTMS targeting the left DLPFC (10 Hz, 3000 pulses, 110% resting motor threshold) across ten sessions over two weeks. Immediately following stimulation, participants will complete standardized physiotherapy. Primary outcomes include motor function (MDS-UPDRS-III and Timed Up and Go). Secondary outcomes include depressive symptoms (PHQ-9), cognition (MoCA), global functioning (SOFAS), and rehabilitation engagement. Linear mixed-effects models and mediation analyses will examine whether improvements in mood or executive functioning predict enhanced rehabilitation participation and subsequent motor gains. Testing integrated neuromodulation strategies targeting both motor and neuropsychiatric circuits may clarify whether improving behavioral engagement can produce synergistic gains in motor function and daily functioning in Parkinson disease.

The Neural and Physiological Effects of Somatic Mindfulness During Self-Evaluative Anxiety in Musicians

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Music performance anxiety (MPA) is a debilitating condition among musicians, often characterized by heightened physiological arousal and altered neural activity during evaluative performances. Body Mapping is a somatic mindfulness approach that uses bodily awareness to support brain-body regulation; however, the neural and physiological mechanisms through which it may influence self-evaluative performance anxiety remain unclear. This study examined whether a three-week Body Mapping intervention was associated with changes in physiological arousal and task-related neural activity during self-evaluative performance anxiety. Twenty-three professional musicians aged 17–66 completed pre- and post-intervention testing. At each timepoint, participants performed a recorded solo repertoire in front of a mock jury panel, completed the revised Kenny Music Performance Anxiety Inventory (K-MPAI), and underwent fMRI while viewing their own performance to elicit self-evaluative anxiety. Heart rate was recorded during scanning using an MRI-compatible pulse oximeter. Task-related neural activity was examined in regions involved in threat detection and regulatory control. Significant post-intervention decreases in activation were observed in the left middle temporal gyrus, left superior frontal gyrus, left superior temporal gyrus, left inferior frontal gyrus, and right posterior cingulate cortex. This suggests reduced neural engagement in self-evaluative processing, with less rumination, threat-related interpretation, and regulatory effort during performance self-appraisal. Decreased left middle temporal gyrus activity was also associated with reduced K-MPAI-2 worry/dread scores. Heart rate was significantly lower post-intervention than pre-intervention, with an average decrease of 3.21 bpm. Therefore, Body Mapping results have been associated with reduced physiological arousal and neural activity associated with self-evaluative processing in musicians with MPA. These findings provide neuroscientific evidence that somatic mindfulness interventions may support arousal regulation and reduce maladaptive self-evaluative processing during musical performance.

Localization of Double Negative T cells in the Murine Retina During Glaucoma

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As an extension of the central nervous system (CNS), the retina has been canonically understood as immune privileged, excluding circulating lymphocytes by virtue of the blood-brain barrier (BBB). Yet in recent years, the landscape of neuroimmune cell types has markedly expanded. While microglia have long been appreciated as key players in the CNS parenchyma, brain- adjacent myeloid cells and rare parenchymal lymphocyte populations have been described. In preliminary work, the lab identified double negative T cells (DNTs), lacking CD8 and CD4 expression while expressing the T cell receptor. In other organs, DNTs can act as tissue-resident regulatory cells, suppressing inflammation and promoting privilege. Accordingly, when we genetically ablated DNTs, a massive inflammatory response was triggered. Since T cells orchestrate inflammatory responses, we examined localization of DNTs in glaucoma. Flow evidence revealed that DNTs expand in the retinal parenchyma compared to peripheral circulation, suggesting residency. To corroborate this finding, we focused on the localization of DNTs in retinal parenchyma and optic nerve (ON) head. We examined DBA/2J mice, with elevated intraocular pressure due to retinal pigment breakdown occluding aqueous drainage. In pre-glaucomatous, glaucomatous and advanced glaucoma mouse retinas and eyecups, we investigated overall DNT numbers and distance from peripheral blood vessels using immunohistochemistry and confocal microscopy. Our measurements revealed DNT distance from vessels supports local proliferation over systemic input, and DNTs are present surrounding ON head as glaucoma progresses. These findings further support our study of DNTs in the retina and advance our understanding of tissue resident immune cells in the CNS.

Practicing Mindfulness During Islamic Prayer Enhances Muslim Students' Sense of Well-Being and Mindful Awareness

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Mindfulness is widely understood to enhance emotional regulation, attentional control, and stress reduction through changes in neural networks. However, Islamic mindfulness, particularly khushu' (focused reverent awareness) during Salah (prayer), remains underexplored, especially in relation to physiological indicators such as heart rate. This study hypothesized that integrating mindfulness practices into Islamic prayer would enhance Muslim students' subjective well-being while also producing measurable physiological calm. In a mixed-design experiment, 20 Muslim undergraduate students from the University of Ottawa who regularly performed Salah were randomly assigned to either a mindfulness-enhancement intervention group or a control group continuing their usual prayer practices. Baseline and post-study measures included heart rate recordings and self-report questionnaires (WHO-5, PSS, MAAS-State). The intervention group received mindfulness education and daily khushu' -enhancement practices integrated into prayer for 14 days, while the control group continued their usual prayer routines. A multivariate repeated-measures ANOVA Time × Group interaction was not significant, $F(4, 15) = 0.51$, $p = .728$, indicating that overall changes across outcomes did not significantly differ between the experimental and control groups. Nevertheless, descriptive statistics suggest improvements in well-being, perceived stress, and mindfulness in the intervention group from baseline to post- study. Furthermore, exploratory pairwise comparisons indicate that MAAS scores improved post-study, relative to baseline measures in the experimental condition (Mdiff = .520, SE = .242, p = .045), but not in the control condition (Mdiff = .080, SE = .242, p = .744). Similarly, the experimental condition exhibited lower post-study PSS scores compared to the control condition (Mdiff = 6.000, SE = 2.039, p = .009). These findings suggest that integrating khushu'-focused mindfulness into Islamic prayer may support improvements in perceived stress, well-being, and mindful awareness, though the statistical insignificance of multivariate findings likely reflects limited statistical power and should be examined in larger studies.

Patient Reported Outcome Predictors of Contextual Burden in Multiple Sclerosis

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Secondary disease characteristics of multiple sclerosis (MS) negatively impact quality of life and may make it more challenging to manage life demands. To date, the MS literature has not addressed what factors may influence the impact of contextual burdens that may be encountered. Burdens may include, family and social responsibilities, as well as environmental and task demands. We addressed this gap by developing the Contextual Burden Scale (CBS). The present aim was to determine which factors predicted levels of contextual burden in people with MS (PwMS). One hundred PwMS completed questionnaires assessing secondary disease characteristics of MS and CBS. Correlations examined the relationships between secondary disease characteristics and CBS while controlling for sociodemographical characteristics. Significant variables were subsequently entered into a hierarchical regression model with contextual burden as the dependent variable. An additional logistical regression examined which variables predicted group membership (i.e., high vs. low contextual burden). Significant correlations with contextual burden included: perceived cognitive impairment, mood, fatigue, physical and mental fatigability. These variables statistically significantly predicted contextual burden ($F (12, 79) = 18.32$, $p < .001$, $R2 = .74$). Regression results revealed 70% of the variance in contextual burden was explained by these variables. Of those entered in the model, fatigue ($\beta = .342$, $t (6,79) = 5.39$, $p <.001$) and perceived cognitive impairment ($\beta = .463$, $t (6,79) = 2.61$, $p=.011$) significantly predicted contextual burden. Subsequently, between 50% and 66% of the variance in contextual burden of the variance in group membership was explained by these variables, with perceived cognitive impairment being the only significant predictor ($B = .0274$, $p = .0118$). In conclusion, PwMS with greater perceived cognitive impairment and higher levels of fatigue are more likely to be overburdened by contextual factors. Interventions targeting cognition and fatigue may improve PwMS's ability to cope with demands they may encounter in their life.

Conflicts of Interest
The authors declare that they have no conflict of interests.

Authors' Contributions
JJY: served as Senior Advisor of UOMSC, reviewed abstract submissions to ensure proper formatting standards, drafted the 7th NHAC abstract, drafted and formatted the abstract booklet, and gave the final approval of the abstract booklet to be published.
MD: served as Co-President of UOMSC, reviewed abstract submissions to ensure proper formatting standards, contributed to the drafting of the 7th NHAC abstract, and gave final approval of the abstract booklet to be published.
GK: served as Co-President of UOMSC, reviewed abstract submissions to ensure proper formatting standards, contributed to the drafting of the 7th NHAC abstract, and gave final approval of the abstract booklet to be published.

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