Musculoskeletal Association of Chartered Physiotherapists

MACP Award Report

Awardee Name:	**Michail Arvanitidis**
Date of Report:	**13/03/2025**
Name of the Award:	**Level 2 Research Awards – May 2024**
Amount awarded:	**£1,500**
What the award was used for:	**Attendance to the International Society of Electrophysiology & Kinesiology (ISEK) XXV Conference, in Nagoya, Japan, June 26 – 29, 2024**
Summary of how this award or bursary helped you in your career/clinical/academic practice • MSc/PgD Awards: 200 words • Level 1 Awards: 500 words • Level 2 Awards: 1000 words • Level 3 Awards: 1500 words • Elsevier – report and journal article/podcast/presentation at a conference	**I would like to express my sincere gratitude to the Musculoskeletal Association of Chartered Physiotherapists (MACP) for awarding me the Level 2 Research Award of £1,500 in May 2024, and for their continuous commitment to supporting clinical, research, and educational activities through various awards.** **This invaluable support provided a remarkable opportunity for me to attend and present my research at the International Society of Electrophysiology and Kinesiology (ISEK) 2024 conference in Nagoya, Japan. Participating in this prestigious international event significantly advanced my academic growth and professional development, offering a substantial platform to disseminate findings from my doctoral research and enhancing my visibility within the scientific community.** **My contributions to the ISEK 2024 conference included the dissemination of findings from two distinct research studies, both of which were accepted following peer review, underscoring their scientific relevance and methodological robustness. The first study, titled *"Associations between delayed onset trunk muscle soreness, altered EMG-torque relationships, and lumbar kinematics in dynamic contractions"*, was accepted for an oral presentation. This research aimed to elucidate the influence of delayed onset muscle soreness (DOMS), an experimental acute pain model, on trunk torque steadiness (TS; the ability of an individual to exert steady force output), neuromuscular control, and lumbar spine movements during submaximal concentric and eccentric trunk extensions. High-density surface electromyography (HDsEMG)—a technique involving multiple closely spaced electrodes placed on the skin surface to capture detailed electrical activity patterns from the thoracolumbar erector spinae (ES) muscle —**

	was combined with torque measurements from an isokinetic dynamometer and kinematic analyses using inertial measurement units (IMUs). Twenty asymptomatic participants underwent evaluations across three sessions conducted 24 hours apart. DOMS significantly increased muscle soreness and sensitivity, as quantified by visual analogue scale (VAS) and pressure pain threshold, at both 24 and 48 hours post-induction. Interestingly, participants exhibited improved TS despite increased muscle soreness, particularly during eccentric contractions, during which greater lumbar flexion movements were observed. HDsEMG analyses revealed reduced coherence and cross-correlation with torque at lower frequency bands, suggesting adaptive changes in muscle recruitment strategies. Similarly, during concentric contractions at 48 hours post-DOMS induction, improvements in TS were accompanied by reduced sagittal plane lumbar movement, indicative of a preference for a more neutral lumbar spine posture. Clinically, these adaptations suggest that acute muscular soreness (DOMS) does not appear to impair the ability to control trunk muscle force; however, perceived soreness induced alterations in lumbar movement and muscle recruitment strategies, which could potentially affect motor performance if pain exposure persists over the long term. **The second study, presented as a poster, was titled *"Associations between impaired dynamic trunk muscle control in people with chronic low back pain and altered spatial EMG-torque correlations"*. This research explored the neuromuscular characteristics and dynamic trunk muscle force control impairments in individuals with chronic low back pain (CLBP). The study employed HDsEMG and torque measurements during concentric and eccentric trunk flexion and extension contractions to compare neuromuscular performance between 20 individuals with CLBP and 20 asymptomatic controls. Results indicated significantly reduced torque steadiness in individuals with CLBP across both flexion and extension movements. Specifically, during trunk extension, participants with CLBP displayed increased HDsEMG-torque coherence in the upper thoracolumbar ES region and increased HDsEMG cross-correlation compared to controls. For trunk flexion tasks, individuals with CLBP exhibited heightened activation of abdominal muscles, particularly the external oblique (EO), with a more cranially shifted centre of activity and increased contribution to resultant torque. Clinically, these findings emphasise the need for targeted rehabilitation strategies addressing the specific neuromuscular control deficits and altered muscle activation patterns identified in CLBP patients, aiming to enhance motor control and therapeutic outcomes.**

	Collectively, the findings from these two studies have significant clinical relevance. Firstly, acute muscle soreness was shown to alter movement patterns and muscle recruitment strategies without impairing short-term trunk muscle force control. However, if pain persists and becomes chronic, as seen in individuals with CLBP, clear impairments in force control during both trunk flexion and extension movements were observed. This is particularly important clinically, as physiotherapists typically focus on addressing deficits in muscle strength, endurance, and proprioception (e.g., kinaesthesia), while muscle force control remains an underexplored area. Given the demonstrated impairments in individuals with CLBP, we should explore the effectiveness of targeted therapeutic interventions, such as force steadiness training, specifically designed to address these neuromuscular deficits. **Participating in ISEK 2024 has had a profound impact on my trajectory as a researcher. Engaging directly with internationally recognised experts and exchanging insights with peers from diverse backgrounds expanded my understanding of current scientific methodologies and emerging technologies in the field of electrophysiology and kinesiology. Furthermore, receiving feedback during my oral and poster sessions enriched my analytical perspectives, encouraging me to consider novel hypotheses and methodological refinements that will significantly shape future research directions.** **Beyond professional growth, attending the conference facilitated valuable networking opportunities, laying foundations for potential collaborations with other leading institutions and fostering future multidisciplinary research initiatives. The experience highlighted the importance of interdisciplinary cooperation and opened avenues for potential collaborative projects, broadening the scope and impact of my ongoing and future research activities. This international exposure also bolstered my skills in scientific communication, critical analysis, and methodological rigor. Presenting complex data to an international audience challenged me to articulate my research clearly and effectively, refining my ability to translate detailed scientific findings into actionable insights relevant to both researchers and clinicians. This skill enhancement is particularly valuable in bridging the gap between theoretical research outcomes and practical clinical applications.** **Overall, the award and subsequent participation in ISEK 2024 have marked pivotal milestones in my academic and professional trajectory, fostering significant professional growth and enhancing my contributions to the field of**

	musculoskeletal pain research and rehabilitation science. The insights gained from this experience will undoubtedly influence my future endeavors, shaping my trajectory toward further impactful scientific inquiry and clinical innovation. I am immensely grateful for this recognition and the invaluable experiences facilitated by this award, which will continue to influence my research path and professional contributions significantly.
Picture of awardee/conference/course/ Experience as relevant	**Oral Presentation:**  **Poster Presentation:**