



Queen Margaret University

CENTRE FOR HEALTH, ACTIVITY AND REHABILITATION RESEARCH

PhD Bursary Competition **Centre for Health, Activity and Rehabilitation Research**

Applications are invited for a research training bursary (i.e. A PhD plus Doctoral Certificate in Researcher Enhancement and Development). CHEARR Research Centre sits within the School of Health Sciences at Queen Margaret University, Edinburgh. Applications are invited on any topic related to CHEARR's current research, but our topics for 2022 bursary applications are:

- BUR 22-01 Investigation of the psychometric properties of the Balance Recovery Confidence Scale**
(Dr Judith Lane)
- BUR 22-02 Frame Football**
(Dr Marietta van der Linden)
- BUR 22-03 Evidence based classification for Frame Running, a new Para Athletic event**
(Dr Marietta van der Linden)
- BUR 22-04 Injury risk in competitive youth cyclists**
(Dr Judith Lane)
- BUR 22-05 Community-based rehabilitation and exercise after critical illness**
(Dr Lisa Salisbury)
- BUR 22-06 Application of Motor Learning principles during stroke rehabilitation**
(Dr Gill Baer)
- BUR 22-07 Making buildings and technology work with people who have complex and varied disability for optimal wellbeing and independence**
(Professor Cathy Bulley)
- BUR 22-08 The effect of periodised training load on motor fatigability, sensorimotor and neuromuscular performance capabilities in elite women footballers**
(Professor Tom Mercer, Professor Nigel Gleeson, Nathan Ring)
- BUR 22-21 A feasibility study investigating the effectiveness of sclerosing alcohol injections for the management of Morton's neuroma.**
(Professor Derek Santos)

The successful applicant will be working within a highly skilled team of subject experts in a world-class laboratory and will receive:

- full waiver of tuition fees.
- an annual stipend of £15,609 lasting 3 years for full-time study.
- a research budget of £2000 to cover project expenses and travel.

In addition to this bursary opportunity, CHEARR welcomes applications for co-supervision of students registered at other institutions or with external funding at any time. Self-funded and

externally registered students would have more flexibility in the topic of their research and should contact relevant potential supervisors.

The deadline for applications is Friday 11 March 2022. See [here](#) online.

BUR 22-01

Working title: Investigation of the psychometric properties of the Balance Recovery Confidence Scale.

Background: Falls are a common and serious problem for older adults and are the second leading cause of death among older adults worldwide¹. Falls can result in distress, pain, injury, loss of confidence, loss of independence and mortality². The annual cost of falls spend by the NHS has been estimated over £2.3 billion² and is expected to rise with an ageing population³. Strategies to reduce falls and enhance older peoples falls-efficacy are therefore necessary.

The Balance Recovery Confidence (BRC) scale is a novel instrument developed by our research team⁴. The BRC scale is a distinctive patient-reported outcome measure (PROM) that assesses balance recovery confidence across various perturbation-type scenarios. The scale has excellent psychometric properties and has shown greater congruence to reactive postural control than other PROMs for balance confidence, fear of falling and perceived functional ability. The initial evaluation of its psychometric properties revealed that the instrument is well accepted by the community-dwelling older adults in Singapore. The scale was shown to be unidimensional with good internal consistency and test-retest reliability. Correlations with other PROMs (ABC, FES-I, LLFDI-F and Mini BESTest) were moderate suggesting that the BRC can offer additional information which can support our understanding of the management of falls in older people. The BRC scale has the potential to benefit clinicians' measurement of falls in order to individualise falls rehabilitation however further work is required to explore the generalisability of the BRC scale to a UK population. Further psychometric properties, e.g., responsiveness, minimal important difference (MID), also require evaluation. More studies on BRCs scale measurement properties would improve confidence among researchers and clinicians on the scale's utility.

The work is novel, with potential for wide clinical impact. The scale would be useful for those wishing to assess perceived reactive balance recovery control. Further studies to assess responsiveness and minimal important difference are needed to provide further evidence of the clinical utility of the scale and to extend the impact of the existing work.

Examples of the research questions of proposed studentship:

- A cross-cultural validation of the Balance Recovery Confidence (BRC) Scale for the United Kingdom
- What are the psychometric properties of the BRC scale – UK version?

For enquiries and further information please contact: Dr Judith Lane (jlane@qmu.ac.uk)

References:

1. WHO. Falls. World Health Organisation. <https://www.who.int/news-room/fact-sheets/detail/falls>
2. NICE. Falls: Assessment and prevention of falls in older people. Department of health. <https://www.nice.org.uk/guidance/cg161>
3. Orton, F. The FLEXI Study (FaLls Exercise Implementation). 2021
4. Soh SLH, Gilmour F., Lane J, Asokan S., Woan KL, Tan CW. Constructing a measure of balance recovery confidence for older persons: content themes from different stakeholders. *International Practice Development Journal*, 2021; 11(1):1-19. DOI:10.19043/ipdj.111.XX

BUR 22-02

Frame Football

Frame Football (<https://www.ifcpf.com/development/frame-football>) allows athletes with moderate-to-severe mobility impairments to play football. It was developed in England in 2014 and is now played in countries worldwide as a participation programme with hopes that it will one day become an internationally competitive sport. The International Federation of Cerebral Palsy Football (IFCPF) is working in partnership with the Cerebral Palsy International Sports and Recreation Association (CPISRA) to further explore and develop this new format of football. Although there are several similarities with RaceRunning, for example regarding the high support athletes participating in these sports, there are also a few important differences. One them is the fact that the majority of Frame Football players are under 16. Although a decline in physical activity participation is also observed in early teens in the general population (e.g [1]), CP specific factors such as pain and fatigue [2] may also play an important role in this decline [3]. The proposed PhD will be able assist with the further development of Frame Football at a recreational level and ultimately at an international competitive level in variety of ways:

- Research into the benefits of Frame Football on physical and mental health and wellbeing (survey, qualitative research)
- Research into the factors associated with Frame Football participation.
- Research into how the design of the game frame could be adapted to the demands of older players and those with more severe mobility impairments
- Research into evidence-based classification for Frame Football as an international competitive event

For enquiries and further information please contact: Dr Marietta van der Linden
(mvanderlinden@qmu.ac.uk)

References

- [1] Scottish Government. (2018) Scottish health survey 2017 volume one - main report.: <https://www.gov.scot/publications/scottish-health-survey-2017-volume-1-main-report/pages/93/>.
- [2] Van der Linden ML et al. (2022) Population-based study into the participation in leisure time physical activity of children and young people with cerebral palsy. Accepted for publication in *Pediatric Physical Therapy*.
- [3] Østergaard, C et al (2020). Pain is frequent in children with cerebral palsy and negatively affects physical activity and participation. *Acta paediatrica*,

BUR 22-03

Evidence based classification for Frame Running, a new Para Athletic event

Since the 1st of January 2018, Frame Running (www.framerunning.org), formerly known as RaceRunning, is a World Para Athletics (WPA) event. Frame Running athletes propel themselves using a Frame Running frame which has three wheels, a saddle, breast plate for support and handlebars. Athletes propel themselves with their legs using a variety of propulsion techniques. Frame Running specifically caters for athletes who cannot walk or have severe difficulty walking. Classification in para sports allocates athletes to sport classes based on their impairment and according to the IPC (International Paralympic Committee) should 'minimise the impact of eligible impairments on the outcome of competition' [1]. Since 2007 classification systems are required to be based on scientific evidence. Recent research has provided this evidence for a Frame Running classification [2,3]. However, it is important that further data continues to be collected to further strengthen the evidence base for Frame Running classification. Further, classification research with regard to Frame Running may also be relevant for other sports in which athletes with a coordination impairment compete.

Examples of the research questions of this studentship include:

- How do Dyskinesia and Ataxia impact Frame Running performance?
- What is the test–retest reliability of the measures in the proposed evidence-based classification system in the Frame Running athlete population?
- Which measures (if any) in the new evidence-based classification system may be susceptible to Intentional Misrepresentation [4] and how can this be detected?

For enquiries and further information please contact: Dr Marietta van der Linden
(mvanderlinden@qmu.ac.uk)

References

- [1] Tweedy SM, Vanlandewijck YC (2011). International Paralympic Committee position stand — background and scientific principles of classification in Paralympic sport. *Br J Sports Med* 45:259–69.
- [2] van der Linden et al (2018). The influence of lower limb impairments on RaceRunning performance in athletes with hypertonia, ataxia or athetosis. *Gait Posture* 61: 362-367.
- [3] van der Linden, et al. (2020) Cluster analysis of impairment measures to inform an evidence-based classification structure in RaceRunning, a new World Para Athletic event for athletes with hypertonia, ataxia or athetosis. *Journal of sports sciences* 39: 159–166.
- [4] Ravensbergen et al (2018). Detecting Cheating when Testing Vision: Variability in Acuity Measures Reveals Misrepresentation. *Optom Vis Sci.* 95(6):536-544.

BUR 22-04

Working title: Injury risk in competitive youth cyclists

Background: Cycling is a popular activity for many young people. Cycle racing is flourishing at the youth level with thousands regularly participating ^[1]. Although cycling is commonly thought to be a low impact sport, and therefore a lower risk for non-traumatic injury, relatively static postures combined with a repeated cycling action in addition to the higher volume of training associated with racing may potentially place the youth racer at increased risk of injury. Knee and back pain are the most commonly reported injuries in the cycling population ^[2].

Across the wider adolescent population, knee pain is a commonly reported condition. Although knee pain in adolescents is thought by many to be a self-limiting condition, studies have shown that as many as one in two adolescents will still report pain one year later and four out of ten still report significant knee pain five years later ^[3]. Chronic knee pain has a significant impact on quality of life and 60% of young people had either stopped or reduced their sporting activity as a result of their knee pain. A greater understanding of factors that contribute to the development of knee pain would therefore be beneficial.

Several studies have explored injury risk in young athletes although there is a lack of consistent guidance. Jaythani et al ^[4] reported that higher levels of sport specialization were associated with increased injuries. Studies of elite adolescent athletes have however suggested that injury risk is multifactorial and that factors such as nutritional status and sleep are significant ^[5].

Although the prevalence of knee pain in the general adolescent population has been fairly well documented, few studies have considered the effect of type or level of sporting activity on the risk for developing knee pain. Murray ^[6] notes the large degree of variability in typical training loads across different sports and suggests that there may be a link between type of sport and injury risk. In addition, sports specific elements such as age of specialization, the environment, equipment and sporting rules may have a role to play ^[5]. To date however, despite the potential for knee injury, little is known about the prevalence and risk factors for non-traumatic musculoskeletal injuries in youth cycle racers ^[7].

Examples of the research questions of the studentship:

- 1) What is already known about the risk factors for knee pain in competitive youth cyclist? (systematic review)
- 2) What is the prevalence of non-traumatic knee injuries in competitive adolescent cyclists? (survey)
- 3) A multifactorial, longitudinal analysis of biopsychosocial risk factors (e.g. training load, nutritional status, sleep, mental health) for knee injury in competitive adolescent cyclists.

For enquiries and further information please contact: Dr Judith Lane (jlane@qmu.ac.uk)

References

1. BRITISH CYCLING, 2019. *A Year in Review*. Manchester: British Cycling.
2. LANE J, CUTHBERT R. 2017. The prevalence of non-traumatic musculoskeletal injuries in non-professional road cyclists. *Physiotherapy*, vol 103, suppl 1.
3. RATHLEFF, M.S., et al, 2019. Five-year prognosis and impact of adolescent knee pain: a prospective population-based cohort study of 504 adolescents in Denmark. *Paediatrics*, vol 9, no. 5, e024113
4. JAYANTHI N, et al. 2020. Risk of Injuries Associated With Sport Specialization and Intense Training Patterns in Young Athletes: A Longitudinal Clinical Case-Control Study. *Orthopaedic Journal of Sports Medicine*. doi:10.1177/2325967120922764
5. VON ROSEN P, et al. 2017. Multiple factors explain injury risk in adolescent elite athletes: Applying a biopsychosocial perspective. *Scand J Med Sci Sports*. Vol 27, no12, pp.2059-2069.
6. MURRAY, A, 2017. Managing the training load in adolescent athletes. *International Journal of Sports Physiology and performance*, vol 12, S2-42 -S2-49
7. ALEMAN, K.B., MEYERS, M.C., 2010. Mountain Biking Injuries in Children and Adolescents. *Sports Med.*, Vol 40, pp.77–90

BUR 22-05

Working Title: Community-based rehabilitation and exercise after critical illness

Background: Annually about 100,000 patients are admitted to Intensive Care Units in the United Kingdom with about 75% surviving to hospital discharge. There is now compelling evidence of ongoing physical, cognitive and psychological problems after critical illness that are frequently not addressed through current care provision [1, 2]. Physical problems may contribute to a prolonged recovery time and for many, exercising and participating in a structured exercise programme is challenging. There is a lack of a co-ordinated rehabilitation pathway and survivors' needs are often neither identified nor specifically addressed [3]. There is still uncertainty about the most effective way to deliver physical rehabilitation after critical illness and in particular after discharge home [4, 5]. Discharge home is becoming increasingly 'quicker' and targeted at those who are 'sicker' shifting both the burden and complexity of care delivery to community services. As a result, the development and evaluation of community-based rehabilitation is increasingly important. Qualitative evaluation of an exercise programme delivered immediately after discharge from hospital highlighted the importance placed on exercise by survivors of critical illness but identified barriers to the intervention, that had been designed by health professionals, including poor mental health, physical limitations and lack of motivation [6]. Our own work has highlighted that recovery following critical illness happens within an individual's time-frame, not a schedule imposed by the healthcare system, and rehabilitation and exercise interventions need to be responsive to this [3]. This study will employ a mixed methods approach to firstly identify rehabilitation needs of survivors of critical illness after discharge from hospital and explore potential models for the delivery of exercise rehabilitation. Secondly, this data will be used to develop and pilot the feasibility of a community-based model of rehabilitation and exercise delivery after critical illness. It is anticipated engagement with survivors of critical illness will ensure the intervention is responsive to their needs and inform a community-based model of rehabilitation which promotes self and long-term management.

Examples of the research projects include:

1. To explore the rehabilitation needs and potential models of community-based exercise rehabilitation with survivors of critical illness.
2. To develop a community-based exercise rehabilitation intervention with survivors of critical illness.
3. To pilot and explore the feasibility of a developed community-based exercise rehabilitation intervention for survivors of critical illness.

For enquiries and further information please contact: Dr Lisa Salisbury
(Lsalisbury@qmu.ac.uk)

References

- [1] Needham DM, Davidson J, Cohen H, Hopkins RO, Weinert C, Wunsch H, et al. Improving long-term outcomes after discharge from intensive care unit. *Crit Care Med*. 2012;40:502–9.
- [2] Harvey MA, Davidson JE. Postintensive Care Syndrome: Right Care, Right Now...and Later. *Crit Care Med*. 2016 Vol 44, pp.381–5.
- [3] Kean, S, Salisbury, LG, Rattray, JE, Walsh, TS, Huby, G & Ramsay, P (2016). 'ICU Survivorship' - a constructivist grounded theory of surviving critical illness. *Journal of Clinical Nursing*, Vol 26, No 19-20, pp. 3111-3124.
- [4] Connolly, B, Salisbury, L, O'Neill, B, Geneen, L, Douiri, A, Grocott, MP, Hart, N, Walsh, TS, Blackwood, B & ERACIP Group (2015). Exercise rehabilitation following intensive care unit discharge for recovery from critical illness. *Cochrane database of systematic reviews*, vol 6, pp. 1-62., 10.1002/14651858.CD008632.pub2
- [5] Connolly, B, O'Neill, B, Salisbury, L & Blackwood, B (2016). Physical rehabilitation interventions for adult patients during critical illness: An overview of systematic reviews. *Thorax* 71(10):thoraxjnl-2015-208273.
- [6] Ferguson, K, Bradley, JM, McAuley, DF, Blackwood, B & O'Neill (2017). Patients' Perceptions of an Exercise Program Delivered Following Discharge From Hospital After Critical Illness (the Revive Trial). *Journal of Intensive Care Medicine* 1-7.

BUR 22-06

Working Title: Application of Motor Learning principles during stroke rehabilitation

Background: 100,000 people suffer a stroke in the UK each year, with approximately 1.3 million people living with stroke and around two thirds of stroke survivors living with ongoing disability [1]. Physiotherapists help people living with stroke to exercise and practice movements with the aim of relearning of functional tasks affected by their stroke [2]. There are numerous approaches to stroke rehabilitation, however no definitive optimal approach has been identified [3]. There is however, emerging evidence to suggest that specific training during stroke rehabilitation based on Motor Learning (ML) principles may drive neuroplasticity and reduce post-stroke motor impairments [4]. Knowledge and understanding of motor learning (ML) principles is fundamental to physiotherapy and has numerous applications in physiotherapy practice [5]. Key aspects of ML such as task specificity, structuring practice and providing feedback are important elements in clinical practice [6] and empirical evidence from clinical studies provide some insight about how to apply ML principles such as intensity of practice, structure of practice schedules and how to provide feedback in clinical practice [4,5]. Most of these studies have explored single components of ML principles and only a limited number of studies have investigated the efficacy of ML principles in stroke rehabilitation [7]. There is therefore a gap between the integration of ML theory, research and clinical practice in stroke rehabilitation [4,5]. This studentship will explore the topic of motor (re)learning in stroke rehabilitation potentially using a mixed methods approach. This might include a systematic literature review and an initial observational study, followed by a qualitative exploration of physiotherapists' knowledge and perceptions. It is anticipated that these initial phases would inform the development, delivery and evaluation of a comprehensive stroke rehabilitation programme incorporating motor learning principles.

Examples of the research questions of proposed studentship include:

- How are motor learning principles used by physiotherapists during stroke rehabilitation?
- What are physiotherapists' knowledge and perceptions of applying motor learning principles in stroke rehabilitation?
- How can Motor Learning principles be successfully incorporated into a comprehensive stroke rehabilitation programme?

For enquiries and further information please contact: Dr Gill Baer (gbaer@qmu.ac.uk)

References

- [1] Stroke Association (2021) *Stroke Statistics* Available at <https://www.stroke.org.uk/what-is-stroke/stroke-statistics> (accessed 20/12/2021)
- [2] Krakauer, J. (2006), 'Motor learning: its relevance to stroke recovery and neurorehabilitation', *Curr Opin Neurol*, 19 pp. 84-90
- [3] Pollock, A., Baer, G., Campbell, P., Choo, P., Forster, A., Morris, J., Pomeroy, V., and Langhorne, P. (2014) Physical rehabilitation approaches for the recovery of function and mobility following stroke. *Cochrane Database of Systematic Reviews* 2014, Issue 4. Art. No.: CD001920.
- [4] Maier, M., Ballester, B. R., & Verschure, P. (2019). Principles of Neurorehabilitation After Stroke Based on Motor Learning and Brain Plasticity Mechanisms, *Frontiers in systems neuroscience*, 13(74).
- [5] Fisher, B. E., Morton, S. M., and Lang, C. E. (2014), 'From motor learning to physical therapy and back again: the state of the art and science of motor learning rehabilitation research'. *Journal of Neurologic Physical Therapy*, 38(3), pp.149–150.
- [6] Atun-Einy, O. and Kafri, M. 2021 'Physical Therapists' perspectives of the construct of motor learning and their motor learning-based practice a qualitative study', *Physiotherapy Theory and Practice*, 37(12), pp.1377-1390. <https://doi.org/10.1080/09593985.2019.1693676>
- [7] Blennerhassett, J., and Dite, W. (2004) 'Additional task-related practice improves mobility and upper limb function early after stroke: a randomised controlled trial', *The Australian journal of Physiotherapy*, 50(4), pp. 219–224. [https://doi.org/10.1016/s0004-9514\(14\)60111-2](https://doi.org/10.1016/s0004-9514(14)60111-2)

BUR 22-07

Working title: Making buildings and technology work with people who have complex and varied disability for optimal wellbeing and independence

Background: This proposed studentship involves collaboration with Capability Scotland (CS) with specific focus on development of their service provision in Perth – a national residential resource for adults with physical disabilities and/or learning disabilities: Upper Springland (UPS). This accommodates up to 60 people from one-third of the council areas in Scotland.¹ Significant service redesign is underway, including development of a new nearby site, to replace the current campus. CS wish to be sector-leading, engaging actively in research and knowledge exchange to optimise the outcomes of their provision for health and wellbeing of their community. Over the summer 2021 they commissioned QMU to develop research insights into current and optimal service provision, informed by literature and the views of customers and other stakeholders. This project has been completed and work is underway to disseminate the research insights. The findings informed the CS Business Plan for the new site (Bertha Park) and both organisations wish to progress the collaboration relating to research and practice.

A scoping review was conducted, focusing on environmental factors that influence participation for people with disabilities living in residential settings. Results emphasised use of a person-centred co-production approach to design the environment, maximising accessibility and facilitating participation.² Co-production can be inhibited where people are unable to talk to the designers. Active support is needed within appropriate physical spaces that uses assistive and smart technologies to enable residents' expression and development.^{3,4} This needs support, infrastructure and training and can enhance independence, physical activity, social integration and productivity.^{5,6} There is, however, limited research on the ways in which people, buildings, and technology interact optimally. Therefore, gaps have been identified in the literature and practice relating to co-production with people who have varied communication abilities and exploring how care staff can work with residents to facilitate optimal health and wellbeing through optimal use of the physical environment and assistive and smart technologies.

Examples of the research questions of proposed studentship:

- How do we ensure that people who experience communication barriers are able to be co-producers of the optimal configuration of buildings and technology that meet their needs?
- How do co-designed living spaces with integrated assistive and smart technologies impact on physical and psychological wellbeing and independence in people with complex disabilities?
- How can the users of co-designed living spaces and integrated technologies work with together with people involved in their care to ensure that their function and wellbeing are optimised over time?

For enquiries and further information please contact: Professor Cathy Bulley
cbulley@qmu.ac.uk

References

1. CARE INSPECTORATE, 2019b. *Care Inspectorate Report (2019), Upper Springland*. Available online [InspectionReport-304710.pdf](#) 18 August 2021.
2. EISENBERG, Y., et al., 2017. Does the built environment moderate the relationship between having a disability and lower levels of physical activity? A systematic review. *Preventative Medicine*, **95**, pp. s75-s84.
3. KING, E., et al., 2017. Activities of daily living and transition to community living for adults with intellectual disabilities. *Scandinavian journal of occupational therapy*, **24**(5), pp. 357-365.
4. WASHINGTON, S.E., et al., 2021. Environmental Modifications and Supports for Participation Among Adults Aging with Intellectual and Developmental Disabilities: A Scoping Review. *American Journal of Occupational Therapy*, **75**(4).
5. DONEHOWER PAUL, C., et al. 2021 Using Wireless Technology to Support Social Connectedness in Individuals with Intellectual and Developmental Disabilities: A Focus Group Study. *Journal of Special Education Technology*, <https://doi.org/10.1177%2F01626434211004133>.
6. RIPAT, J. and WOODGATE, R.L. 2017. The importance of assistive technology in productivity pursuits of young adults with disabilities. *Work*, **57**(4), pp.455-468.

BUR 22-08

The effect of periodised training load on motor fatigability, sensorimotor and neuromuscular performance capabilities in elite women footballers

Introduction: It is commonplace in male professional soccer to monitor training and match-related physical stress, commonly referred to as workload, in order to maximise player performance and reduce the likelihood of over-training and injury. Specifically, rapidly increasing volumes of high intensity actions such as high-speed running, sprinting, and explosive changes of direction, may leave players especially vulnerable (1). Similarly, arduous training sessions and match-play have been shown to elicit reduced neuromuscular (NM) performance for up to 72 hours subsequently highlighting the potential for critical disruption to homeostasis among soccer players (2). The implementation of tracking devices, such as global positioning systems (GPS), has facilitated a more accurate characterisation of the locomotor activities of elite male players to inform training practices. This has resulted in an optimisation of performance with some minimisation of injuries (3). However, despite this increased evidence for the elite male footballer there remains a relative scarcity of research evidence that characterises the locomotor activities and training load of the elite woman footballer in general (4,5) and the elite Scottish female professional footballer in particular.

The proposed PhD will offer a novel, soccer-specific appraisal of meaningful, contemporary research questions whose findings might have direct applicability to enhanced practices within training to ensure increased likelihood of improved performance and the prevention of injury elite Scottish female football players. The programme of research will be designed to be feasible and compatible with current elite club practices of a Scottish professional senior ladies team and be minimally-intrusive to the playing and support staff. Focus will be placed on the senior professionals and their potential for performance development, but will also involve selective evaluations of junior (under-20) and academy players to facilitate 'baseline' evaluations of performance and fitness capacities. This would facilitate comprehensive limb and muscle group comparisons, 'individualised' post-injury rehabilitative care and objective markers for safe, post-injury return to playing. The culmination of the research would focus on the development and evaluation of the effectiveness of a practically-relevant and novel 'acute' high-intensity fatiguing intervention that would be designed to (i) enhance soccer performance capabilities by minimising fatigability and to lessen the likelihood of musculoskeletal injury in elite female football players and (ii) minimise the likelihood of physiological incompatibility (interference) amongst stimuli for high-intensity and muscular endurance conditioning. Duration of conditioning would be tailored to the time-availability constraints within the women's professional football club for pre-season/intra-season preventative conditioning and, where appropriate, physiotherapeutic rehabilitation. This programme of PhD research proposes to investigate changes in elite female football players' fatigability, neuromuscular, and sensori-motor performance across a playing season, in the context of player load and injury data, to inform the practices of the club's Strength & Conditioning and Medical departments.

Potential exemplar studies:

Study 1: A comparison of agility-related functional capacity and neuromuscular performance capabilities in senior and early-career female professional soccer players across the competitive season

Study 2: An exploration of the effects of the training load associated with the match-play microcycle upon agility-related functional capacity, neuromuscular performance capabilities, and game-related fatigability in elite female footballers.

Study 3: The effects of an acute intra-season neuromuscular and sensorimotor performance conditioning programme on agility-related functional capacity, neuromuscular performance capabilities and resistance to game-related fatigue in female professional soccer players.

Supervisory Team: Professor Tom Mercer (tmercer@qmu.ac.uk), Professor Nigel Gleeson (ngleeson@qmu.ac.uk), Nathan Ring.

References

1. Bowen, L., Gross, A. S., Gimpel, M., & Li, F. X. (2017). Accumulated workloads and the acute: Chronic workload ratio relate to injury risk in elite youth football players. *British Journal of Sports Medicine*. <https://doi.org/10.1136/bjsports-2015-095820>

2. Silva, J. R., Rumpf, M. C., Hertzog, M., Castagna, C., Farooq, A., Girard, O., & Hader, K. (2018). Acute and Residual Soccer Match-Related Fatigue: A Systematic Review and Meta-analysis. *Sports Medicine*. <https://doi.org/10.1007/s40279-017-0798-8>
3. Buchheit, M., & Simpson, B. M. (2017). Player-tracking technology: Half-full or half-empty glass? *International Journal of Sports Physiology and Performance*. <https://doi.org/10.1123/ijsp.2016-0499>
4. Live S et al. (2021) Load Monitoring Practice in Elite Women Association Football. *Front Sports Act Living* ;3:715122. doi: 10.3389/fspor.2021.715122
5. Lillian Gonçalves et al. (2021) Associations between Physical Status and Training Load in Women Soccer Players. *Int J Environ Res Public Health*, 18(19):10015. doi: 10.3390/ijerph18191001
6. Clancy C, Gleeson N, Mercer T. (2022) [Neuromuscular Performance and Training Workload Over an In-Season Mesocycle in Elite Young Soccer Players](#). *Int J Sports Physiol Perform*. 1;17(1):37-43. doi: 10.1123/ijsp.2020-0834.

BUR 22-21

PhD studentship: A feasibility study investigating the effectiveness of sclerosing alcohol injections for the management of Morton's neuroma.

Background:

Morton's neuroma is described as an entrapment or degenerative neuropathy secondary to mechanically induced compression of the intermetatarsal/interdigital nerve as it traverses under the transverse intermetatarsal ligament. There is a lack of current evidence to support effective management of Morton's neuroma although steroid injection is currently the gold standard and supported by higher level evidence with a few randomised control studies although long-term evidence is lacking¹⁻³. Orthotics and footwear advice is also used routinely although the evidence is poor. When these conservative options fail the only pathway available is surgical neurectomy although complications and pain may persist post-surgery. With COVID-19 orthopaedic surgical waiting times have increased considerably and as such a presurgical option involving chemical ablation of the neuroma would have a positive impact not only on waiting times but also offer patients an alternative to surgery. Unlike other conservative treatments, alcohol injections aim to relieve pain by destroying the nerve. It offers potentially an alternative approach and rather than remove the nerve surgically destroying the nerve non-invasively. It will also offer faster recovery times when compared to surgery and its associated risks.

Although alcohol injection for ablation of Morton's neuroma may offer a suitable alternative unfortunately a systematic review suggested that more evidence is required due to poor quality studies⁴. The gaps in the literature identified suggests that a multicentre randomised control trial is not possible at present, and a feasibility study is required to facilitate the design of such study. This novel feasibility study has potential impact to contribute to a cost-effective potential gold standard of a new surgical alternative treatment with improvements in quality of life and impact on reducing surgical waiting times.

Examples of the research questions for the proposed PhD studentship:

What is the most effective alcohol concentration and technique for injection? What is the number of injections required? What is the optimum local anaesthetic and dosage regime? How many participants are required for a multi-centre randomised control trial? Are there any side effects? What control arm to use eg no treatment [on surgical waiting list] and/or surgical neurectomy? What effective short- and long-term outcome tools to use for future RCT?

For further enquiries please contact:

Professor Derek Santos (dsantos@qmu.ac.uk)

References

1. Edwards RT, Yeo ST, Russell D, et al. Cost-effectiveness of steroid (methylprednisolone) injections versus anaesthetic alone for the treatment of Morton's neuroma: Economic evaluation alongside a randomised controlled trial (MortISE trial). *Journal of Foot and Ankle Research*. 2015;8(1). doi:10.1186/S13047-015-0064-Y
2. Thomson CE, Beggs I, Martin DJ, et al. Methylprednisolone injections for the treatment of morton neuroma: A patient-blinded randomized trial. *Journal of Bone and Joint Surgery - Series A*. 2013;95(9):790-798. doi:10.2106/JBJS.I.01780
3. Thomson CE, Gibson JA, Martin D. Interventions for the treatment of Morton's neuroma. *Cochrane Database of Systematic Reviews*. 2004;2011(4). doi:10.1002/14651858.CD003118.PUB2
4. Santos D, Morrison G, Coda A. Sclerosing alcohol injections for the management of intermetatarsal neuromas: A systematic review. *Foot*. 2018;35. doi:10.1016/j.foot.2017.12.003