Sheffield Hallam University

Sport and Physical Activity

The Faculty of Health and Wellbeing has three research centres in sport and physical activity;

- Sport Industry Research Centre (SIRC)
- Centre for Sport and Exercise Science (CSES)
- Centre for Sport Engineering Research (CSER)

In the 2014 Research Excellence Framework (REF), 67% of our research was rated as world-leading and internationally excellent (4* and 3*), with 100% of our research environment judged to be 3* or 4*.

Our innovative and applied research is funded through research councils and charities grants, in addition to investment from companies and organisations in the sport and physical activity industry. Staff have well established national and international collaborations with academics and industry/clinical partners. We have a community of approximately 45 postgraduate students in sport and physical activity who are at the heart of contributing to our research output. All doctoral students are supported by a comprehensive programme of doctoral training and encouraged to present their research findings at national and international conferences.

How to apply

Applicants are requested to email a postgraduate application form (including a 1500 word proposal in section 9) to HWB-DoctoralAdmin@shu.ac.uk by 12 noon on Friday 24 February 2017.

Along with the proposal, please identify:

- the theme outlined below with which your proposal is aligned
- whether you are interested in a full-time (fully-funded) or part-time (fees only) scholarship

You are encouraged to find out more about our staff and their current research to inform the development of your proposal, which will help ensure your proposal aligns with our research themes. However, the details of any successful project could potentially change, given input from the supervisory team.

Where English is not your first language, you must show evidence of English language ability to the following minimum level of proficiency: an overall IELTS score of 7.0 or above, with at least 6.5 in each component or an accepted equivalent. Please note that your test score must be current, i.e. within the last two years.

Please view our eligibility criteria before submitting an application.

Selection process

Interviews will take place week commencing 27 March 2017.

Applicants are required to give a short 10 minute presentation followed by an interview. Interview panel members will include the postgraduate research tutor and a prospective director of studies. Where travel to Sheffield is not possible, interviews may be conducted by Skype or conference call.

Research topics

Applications for PhD study are invited across the following key research themes:

- Sporting capital research (SIRC)
- Social return on Investment in sport (SIRC)
- The economic and policy determinants of Olympic success (SIRC)
- Altering lifestyle to avert non-communicable diseases in high-risk populations (CSES)
- Performance analysis in Olympic swimming (CSER)
- Sports injury prevention (CSER)
- Three-dimensional surface imaging of the human body (CSER)
- Ecological constraints on behaviours of special populations (CSER)

More details of these themes are provided below and, for informal enquires for any of these areas, please contact Dr David Broom (Postgraduate Research Tutor for Sport): d.r.broom@shu.ac.uk who will be able to direct your enquiry to the appropriate person.

Research Themes

Sporting Capital Research (SIRC: Led by Prof Simon Shibli)

The aim of this research is to critically evaluate and empirically test the Sporting Capital theoretical model in order to determine its potential for influencing future sports policy and practice.

Sporting Capital is a concept developed by Nick Rowe using data from the Active People Survey and has received academic recognition in the form of publication. However, up to this point, the concept remains empirically untested with respect to its capacity for helping influence strategic direction in relation to sport participation. This is the foundation for the development of this PhD project.

This work aligns with the agenda of the Sport Industry Research Centre in that it seeks a greater understanding of participation in sport. The established relationships with industry partners clearly indicate the potential impact of this work - practically and in relation to REF. The new Government sport strategy provides the most recent opportunity for embedding Sporting Capital into future policy and practice and, one expression of this has been the support this research idea has attracted from a number of groups charged with improving participation. It is clear that Sporting Capital aligns itself with the five policy outcomes detailed in the new strategy and, as such, it is unsurprising that those partners with whom the Academy of Sport is already strategically linked such as Yorkshire Sport Foundation and Street Games have maintained their interest in helping develop the study. In this respect, it goes without saying that in the longer term this programme of research offers an opportunity for other partners for the University.

Social Return on Investment in Sport (SIRC: Led by Dr Larissa Davies)

SIRC is a leading research centre in the field of sports economics. Social Return on Investment in Sport (SROI) is a growing theme of work for SIRC, which complements our existing work

strands on the economic importance of sport and the impact of major events. In 2014, SIRC used funding from the Higher Education Investment Fund (HEIF) to develop a national model to measure the Social Return of Investment for Sport in England. We have used this work to develop further applications of SROI to sport. We are currently using SROI with a number of clients to measure the impact of sports facilities and various sports. We are collaborating with partners to develop a social value calculator for the Datahub, which is a repository for sport and leisure data, used by a large number of leisure operators in the UK. Furthermore, we have used our SROI research as the proposed measurement framework for a successful ERASMUS project on the benefits of outdoor sport, starting in January 2017.

The use of SROI to measure the wider impact of sport is ground breaking, both within the sports industry but also academically. The research to date provides a platform for improvement in evidence on the social impacts of sport. However, the application of SROI analysis to sport is in its infancy. PhD work in this area will use our SROI research as a starting point and focus on improving social impact measurement in sport. It will draw on theories of economic modelling to improve the accuracy of measuring the social impact of sport, incorporating the areas of health, crime, social capital, education and wellbeing. We envisage that this work will be multidisciplinary, drawing upon evidence from health and other social sciences. The research has the potential to be influential in sports policy and to contribute to wider debates on the measurement of sport within academia in the future.

The economic and policy determinants of Olympic success (SIRC: Led by Prof Simon Shibli)

SIRC is a founder member of the Sports Policy factors leading to International Sporting Success consortium (SPLISS), which was established in 2003. The consortium has produced: two books; two international conferences; one of the most read and cited papers in the history of European Sport Management Quarterly; and countless papers and presentations across the globe.

Currently we work at the heart of a global consortium of 15 nations studying the impact of policy on elite sport development systems. Our methods are used beyond the Olympic Games and we also work on other multi-sport events such as the Commonwealth Games on behalf of the UK's home nations. Our evidence points to elite sport success being an area of policy which can be managed successfully.

With the Rio 2016 Olympic Games complete, we now have a new data set to see whether or not we can refine our models and improve their explanatory power. Pilot research has suggested that the explanatory power of models increases as the specificity of outputs decreases. For example if we measure the number of top eight places achieved by a nation in the Olympic Games the model explains this dependent variable more strongly than a more specific measure of output such as the number of gold medals won. We wish to develop this research further.

In addition, we find that for a measure such as total medals, around 50% of success can be explained by population and wealth. This means that the remaining 50% must be explainable by other factors. We have tested new ideas such as the notion of 'winning streaks' and these ideas show promise. We now need a numerate PhD student to help take these ideas forward and to apply them to other contexts such as the Paralympic Games and the Winter Olympics.

Altering Lifestyle to avert Non-Communicable Diseases in High-Risk Populations (CSES: Led by Dr. Markos Klonizakis)

CSES has used and recommended lifestyle interventions and exercise in particular as adjunct therapies in a number of diseases and conditions (e.g. menopause, varicose veins, venous ulcers, cancer and multiple sclerosis).

With the focus moving quickly from treatment to prevention, the incidence rates for non-communicable diseases (e.g. cardiovascular diseases, cancer, chronic respiratory diseases and diabetes; NCDs) being on the rise and the NCDs themselves being considered as having lifestyle roots, it's important to be at the forefront and follow current National Institute of Health and Care Excellence recommendations of developing research that would use lifestyle alterations as prevention rather than treatment measures.

We have previously successfully used diet (e.g. Mediterranean and New Nordic diets) and exercise and showed that medium term interventions offer longer-term protective benefits in sedentary populations. Building on this experience, it would be interesting to see whether such benefits exist in populations that are in high-risk of developing NCDs, using the research centre's infrastructure and experience.

Performance analysis in Olympic Swimming (CSER. Led by Dr John Kelley)

The Centre for Sports Engineering Research (CSER) has been a Research and Innovation Partner of the English Institute of Sport (EIS) for the past 3 Olympic cycles. CSER carried out 61 projects with 10 sports during the last Olympic cycle and this supported athletes that won a total of 42 medals at the 2016 Rio Olympics. This partnership was showcased in a blog article by Professor Chris Husbands, the Sheffield Hallam University Vice Chancellor, as an exemplar of the how universities can have real-world impact. The nature of the support is often providing cutting-edge bespoke software and/or hardware solutions to support the Sports in the training and competition environments. The partnership has also included 4 PhDs, each working with a Sport.

CSER has worked with British Swimming extensively over the past 8 years. Major projects include:

- Producing British Swimming's race analysis system – Nemo
- Producing a start and turn analysis system that incorporates above and below water filming – Swimtrack – at the Loughborough National Training Centre.
- Producing software and supporting the hardware installation of a permanent underwater swimming analysis system at the Bath National Training Centre

British Swimming enjoyed their most successful Olympics ever at Rio 2016 and will be looking to build on that for Tokyo 2020. The PhD research will be related to the work CSER does with British Swimming and provides the opportunity to work with world-leading athletes, support staff and infrastructure. This might be continuing prior research, using data collected by the CSER systems or asking a new research question based on current and future projects. Possible research areas include:

- Start and turn analysis using the data collected from Swimtrack. This could look at athlete progression, intervention studies and development on the system and the analysis process.
- Automatic data collection from training environments. This would implement work from a previous PhD that determined the calibration process and progressed work on automated stroke-rate detection for a camera based system. The work could be both practical system development and data analysis, cross-referencing with the data collected from competitions using Nemo.
- Underwater swimming analysis using the systems at the national training centres and footage collected by CSER and British Swimming at major international competitions. This is a new area of development for British Swimming and there are likely to be many avenues to explore.

Sports Injury Prevention (CSER. Led by Nick Hamilton)

Injury prevention is a key research area of the Centre for Sports Engineering Research. This work aims to reduce the prevalence of injury in sport through the development and evaluation of protective equipment and infrastructure.

CSER have a strong reputation in sports injury research and have delivered many successful projects in collaboration with; governing bodies, commercial companies, standards agencies, elite sports and athletes. Our work has sought to understand the mechanisms of sports injury in order to mitigate their effect and inform the design of sports equipment and materials through a comprehensive methodology exploring:

- causality;
- infield measurement;
- lab replication and testing;
- material design and characterisation;
- product development.

We have pioneered the use of infield measurements to better understand the causality of injury. This research has informed laboratory testing that can simulate injurious scenarios with fidelity. Materials and designs have been evaluated, characterized and developed to minimize the incidence of injury.

Recent projects include:

- infield testing of football stud traction (adidas);
- characterisation and simulation of in play football movements (adidas);
- measurement of the damping characteristics of artificial turf (Labosport);
- characterisation of snowboarding wrist guard performance;
- characterisation and simulation of laceration injuries from studded footwear in rugby (World Rugby);

- measurement of hip injury impact forces in figure skating;
- characterization of materials for impact protection on human tissue;
- development of auxetic foams specifically to reduce the forces during impacts within sports.

CSER welcomes applications for PhD study within the scope of injury prevention. Proposals should address a significant need within sport and focus on engineering techniques and methodologies.

Successful applicants will benefit from the knowledge, facilities and capabilities of a world leading sports engineering group and will be able to develop rich research opportunities and commercial markets in the field.

3D shape analysis and human body measurement (CSER: Led by Dr Jon Wheat)

Imaging in three-dimensions has come of age. Devices which can capture the external surface of an object or individual can now be purchased for less than £200. Through a research programme lasting over 4 years, we have developed an accurate (~3 mm), flexible and low-cost (~£1,500) 3D imaging system which we have demonstrated is an effective tool for measurement of human body size and shape in health and sport.

Our work has demonstrated the system to be an effective replacement for traditional measurement tools (callipers, tape measure etc.). However, our interests lie in the new applications of this technology. There is great potential for advanced analysis and measurement which is impossible by traditional means. Work in the Centre for Sports Engineering Research is focused on applications and developments in sport, health and physical activity. Your project would be concerned with the application of this new technology to these research areas.

We are looking for excellent candidates to work with our research group and we are particularly interested in how 3D shape analysis can be used to improve the measurement of the human body i.e. how 3D 'shape' in human body measurement can be used to inform, predict and diagnose.

In the past we have completed projects regarding:

- The assessment, monitoring and measurement of women undergoing breast cancer treatment
- A motivation, measurement and assessment tool in obese populations
- Bespoke training and assessment in elite sport for talent ID and training

We would expect your work to complement our existing work and demonstrate advancement in the field. We are interested in technical developments, participant-based studies and potential areas of application for our system. Your project could focus on any of these areas.

Ecological constraints on behaviours of special populations (CSER Led by Prof Keith Davids)

We are a group of researchers who collaborate in the applied movement sciences subject area. We have been working together for a few years and have built extensive networks with other scientists in different countries to disseminate knowledge on people with cognitive-motor deficits. In previous published studies, we have, for example, investigated gait performance in older adults with and without motor disabilities (e.g. stroke), investigating the roles of perception in obstacle crossing, inter-limb synergies and coordination under different task constraints.

Historically, the rehabilitation sciences have used different models for therapy of people with long-term neurological conditions and older adults who are at risks of falling. The models have mainly emphasised traditional methodologies, such as Bobath's technique for control of muscle spasticity and information processing for re-programming of motor skills.

Contemporary models of motor learning, based on non-linearity in motor behaviours, such as Ecological Dynamics (ED), propose that regulation of voluntary movements emerges from continuous interactions between personal, task and environmental constraints in a dynamic manner. Information from the environment is used to regulate actions, and, in turn, voluntary movements facilitate further perceptions. Due to complexity of motor control in people with special needs (e.g. stroke, Parkinson's disease, older adult fallers, etc.) using therapeutic models based on ED principles could be beneficial for these groups of people who suffer from cognitive-motor dysfunctions (e.g. memory deficit, poor attention, ineffective motor planning, etc.) and are not able to use indirect methods of information processing such as following verbal instructions and feedback and demonstrations.

Our research develops functional intervention designs to improve perceptual-motor capacities (e.g. visual and proprioceptive integration) in special populations and extends our previous work. The benefits could include developing understanding of how to design therapeutic practices to enhance perceptual-motor coupling during exercises in rehab settings or gyms and at home to increase the capacity of disabled people to function independently and safely.