University of Birmingham

Sport, Exercise and Rehabilitation Sciences Research

We achieved an outstanding performance in the Research Excellence Framework 2014 (REF 2014). More than half of the School's work is ranked as 4*, identifying it as world leading, with 90 per cent if its research classified as world leading or internationally excellent.

These results provide further compelling evidence of the long recognised research strength of Sport and Exercise Sciences at the University of Birmingham.

The School's Research Mission is to address one of the key challenges facing contemporary societies: increasing the quantity and quality of engagement in physical activity to enhance health and wellbeing.

We are interested in finding new ways to support the physical activity and sport needs of all individuals and communities ranging from elite athletes, to young children, elderly exercisers, inactive groups and those recovering from illness or injury. To do this we focus our research on three interdisciplinary themes that address major societal challenges.

Open all sections

Sport performance, policy and education

Investigating how to support learners of all ages to engage in meaningful, high quality movement experiences and to improve their performance

Sport is a global cultural phenomenon and we study it from single- multi- and inter-disciplinary perspectives. Our aim in this theme is to build new bridges between research, theory and practice to ensure maximum research impact.

With respect to sport performance, we do basic and translational work around optimising nutrition and training strategies to impact endurance training; and by using 3D motion analysis systems and force plates in the laboratory - or GPS and accelerometry in the field - we inform movement optimisation in athletes. In psychology, we investigate the impact of psychological and emotional factors (e.g., motivation, anxiety, and confidence) and psychological techniques (such as the work on imagery within our BRIO group) on the learning and performing of movement skills; and sport psychologists examine how the motivational characteristics of the coaching (and parental) environments and intra team behaviour affect participation in sport. We have developed the world-leading, evidence-based Empowering Coaching™ training programmes for coaches, teachers and participants. We possess the expertise to evaluate such training programmes using a variety of methods.

Our pedagogy and policy social science research group works with key stakeholders to challenge and influence policy and practice. The **Sport Policy Centre (/research/activity/sport-policy-centre/index.aspx)** evaluates the effects and effectiveness of sport policy locally, nationally and internationally. Researchers in the School have sought to understand how politics has impacted on the delivery of sport in terms of its governance, why states invest heavily in elite sport – in particular through hosting sports mega-events – and how governments use sport as a tool for achieving non-sporting objectives. Researchers in the field of sport pedagogy conduct multi-method evaluations of the nature and impact of professional development initiatives for teachers, coaches, and exercise instructors; and focus on finding new ways to develop and deliver effective professional practice. .

Exercise, Medicine and Health

Investigating the mechanisms by which exercise aids health, and prevents and treats disease

Physical inactivity is reportedly the fourth leading cause of death worldwide[1]. Conversely engaging in regular exercise bestows a broad range of health benefits and can be a valuable adjunctive therapy in the treatment of disease and disability.

Within this theme a wide range of research is undertaken to assess the effects of exercise on bodily systems in a diverse range of populations across the lifespan. Our work is important because to understand how exercise can maintain health, and prevent and treat disease we first need to understand the mechanisms by which exercise affects the cells, tissues and systems of the human body. This work is also required to better understand how exercise interventions might be optimized (e.g., intensity, duration, mode) or even individualized, such that they are as effective as possible in eliciting the desired adaptive response. The body's response to an acute bout of exercise also provides a valuable assessment of physiological functioning, and our ongoing studies are using such tests to assess the benefits of interventions (e.g., exercise, pharmacological or nutritional) or to reveal abnormalities in physiological regulation that may limit physical capacity.

We work with healthy young and older individuals with a variety of fitness levels, ranging from professional athletes to those who are unaccustomed to exercise. Studies are also regularly conducted in those with conditions, such as cardiovascular disease, rheumatoid arthritis, diabetes and dementia. We investigate the mechanisms by which exercise has broad impacts on the human body, from the muscle to the brain, metabolism to cognition, and from the heart to the immune system.

The key research priorities of this theme are to better understand:

1. the mechanisms by which exercise promotes better health,
2. how exercise interventions may be optimized to promote health, and
3. the factors that limit exercise performance in a diverse range of populations.

[1]Kohl et al., Lancet. 380, No. 9838, p294–305, 2012.

Human Movement and Rehabilitation

Investigating mechanisms and conditions affecting the control of human movement that inform new and effective methods for diagnosis and rehabilitation

Normal control of movement can go awry in neurological and musculoskeletal conditions. This includes Parkinson's disease, stroke and traumatic brain injury, as well as low back pain, whiplash and arthritis. To understand the aetiology of such conditions to develop effective treatments, it is first necessary to understand the healthy brain and body.

Within this theme, we undertake a wide range of research into the control of human movement both in healthy and diseased states. This ranges from understanding the basic mechanisms of human posture and movement, through to developing new diagnostics and rehabilitation methods for patients with neurological or musculoskeletal conditions. We utilise a range of techniques, including motion capture, brain stimulation and imaging, and ultrasound. We have expertise in a variety of research methods including systematic reviews, randomised control trials and mixed methods.

With established expertise in sensorimotor and rehabilitation science, combined with numerous clinical links with local hospitals, we are well placed to undertake research that can benefit both healthy individuals and patients.