WELCOME TO HEALTH SCIENCES RESEARCH

By Professor Peter Hogg (Research Centre Director) and Dr Steve Preece (Research Centre Deputy Director)

The Centre for Health Sciences Research is a thriving, multidisciplinary group, focused on improving health outcomes for a wide range of people and communities, through innovation and research.

The difference we are making in our research areas is reflected in the 2014 REF impact case studies, two thirds of which were recognised as being of internationally excellent or world leading quality. Although primarily based in the School of Health Sciences, our members come from a wide range of backgrounds, from physics to physiotherapy, making us well placed to drive forward innovation, research and practice in health and wellbeing in the 21st century.

Our research spans a wide range of areas, from gait biomechanics and assistive device design, through to clinical rehabilitation, public health, psychology and diagnostic imaging. Much of our work is funded by the Engineering and Physical Sciences Research Council (SPSRC), the National Institute for Health Research (NIHR) and medical charities, and our partnerships with industrial and sports organisations, including Reckitt Benkiser, Chas A Blatchford and the Manchester Institute of Health and Performance.

We are a true community, holding regular research seminars throughout the year to share knowledge and expertise, and our newsletters, blogs and tweets keep our community updated with the latest research news across our Centre. We provide excellent support for new researchers with our Early Career Researcher Group and continue to support Mid-Career Researchers too.
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OUR RESEARCH SPANS A WIDE RANGE OF AREAS, FROM GAIT BIOMECHANICS AND ASSISTIVE DEVICE DESIGN, THROUGH TO CLINICAL REHABILITATION, PUBLIC HEALTH, PSYCHOLOGY AND DIAGNOSTIC IMAGING
Equity, Health and Wellbeing

**Lead: Professor Penny Cook (P.A.Cook@salford.ac.uk)**

We carry out research into important aspects of health and wellbeing affecting people today, with particular focus on inequalities in health and issues in the workplace and the working age population. We specialise in applying and evaluating evidence-based health practice, and the design, development and evaluation of contemporary health interventions. Our research looks at specific health issues, such as chronic illness, behaviour change, physical activity and alcohol misuse, within settings such as workplaces, schools or communities, and uses a range of intervention and evaluation methods. We are an interdisciplinary group with biopsychosocial expertise, including public health scientists, physiotherapists, exercise and health scientists, psychologists and sociologists.
Diagnostic Imaging

Lead: Professor Peter Hogg (P.Hogg@salford.ac.uk)

Our diagnostic imaging research makes a real difference in the detection and diagnosis of diseases, to improve outlooks for patients. Our first area of focus is improving image quality and lesion detection in computed and digital radiography and CT scans, whilst at the same time minimizing patients’ exposure to x-radiation. Secondly, we aim to improve breast cancer screening and diagnosis using full field digital mammography. We collaborate with a wide range of clients, patients and healthcare staff around the world to develop and validate innovative methods and improve existing practices. Our research has won a number of awards, such as ‘best papers’ in various conferences and ‘best journal paper’.

Find out more

www.salford.ac.uk/research/health-sciences/research-groups/diagnostic-imaging

@salfordrads

Read our blog here: salfordradiography.wordpress.com/

Applied Psychology: Social, Physical and Technology Enabled Environments

Lead: Dr Sarah Norgate (S.H.Norgate@salford.ac.uk)

Our research team are excited about understanding how people interact with their social, physical and technological environments, and using these findings to improve their experiences. We capture the diversity in psychological responses to these environments by researching the individual differences in people’s performances under various simulation or mood inducing conditions, using methods such as eye tracking and brain imaging.

Our research is relevant to the challenges of today, as we measure the impact of app use and how this changes learning and emotions in children, adults and organisations; as well as research into the role of social media, politics and the media in identity formation. We also research how people with autism spectrum disorder are treated in the justice system to improve their experiences with these services.
**Rheumatology and Musculoskeletal Rehabilitation**

**Leads: Prof Alison Hammond** (A.Hammond@salford.ac.uk) and **Dr Yeliz Prior** (Y.Prior@salford.ac.uk)

We focus on the rehabilitation of people with musculoskeletal and rheumatic diseases, with particular reference to the test and development of patient reported outcome measures (PROMs), which are used to understand how patients feel about their quality of life and health before and after procedures. We also look at occupational therapy interventions, patient education and the use of online / digital technologies to help to improve patients’ self-management of rheumatic and musculoskeletal conditions through mixed-methods research.

**Rehabilitation Technologies and Biomedical Engineering**

**Lead: Professor Los Kenney** (L.P.J.Kenney@salford.ac.uk)

The Rehabilitation Technologies and Biomedical Engineering Group at Salford is a cross-school research initiative, jointly led by Professors David Howard (Computing, Science and Engineering) and Laurence Kenney (Health Sciences). We focus on the design and development of new rehabilitation technologies, aimed at assisting functional movement, together with novel methods for their evaluation.

We have a strong record in external funding from NIHR, EPSRC and charities, and work with a number of leading industrial partners, including Chas A Blatchfords and Odstock Medical. Key application areas include prosthetics, functional electrical stimulation and walking aids.
Measurement and Quantification of Physical Behaviour

Lead: Professor Malcom Granat (M.H.Granat@salford.ac.uk).

The Physical Behaviour research programme aims to promote and facilitate the study and applications of objective measurement and quantification of free-living physical behaviour and its related constructs using body-worn devices. The group has four main overlapping themes: development of outcomes measures, based on physical activity patterns, to quantify the effectiveness of interventions in a range of clinical groups (e.g. stroke, OA, heart failure); use of physical behaviour outcomes to evaluate public health interventions and study the relationship between physical behaviour and health; development of new of new analysis techniques to provide an enhanced understanding of free-living physical behaviour; falls monitoring and falls prediction.

Find out more
www.salford.ac.uk/research/health-sciences/research-groups/measurement-and-quantification-of-physical-behaviour

Knee, Ankle and Foot

Leads: Professors Chris Nester (C.J.Nester@salford.ac.uk) and Rich Jones (R.K.Jones@salford.ac.uk)

The Foot and Knee research programme focuses on the real-world functioning of the foot and knee, across a wide variety of patients and settings, to improve solutions for related injuries and diseases. We look at the biomechanical function of the foot and knee during walking, running and sports; how they are affected by age and diseases such as diabetes, obesity and osteoarthritis; and injuries including lateral ankle sprain and ACL tears.

We use clinical and patient research to investigate the consequences of poor foot and knee health for patients and athletes, and look at a wide range of physical therapy, device and health behaviour interventions.

Find out more
www.salford.ac.uk/research/health-sciences/research-groups/knee-ankle-and-foot

@rhs067 / @richkjones
Sport and Exercise Science

**Lead: Dr Paul Comfort** *(P.Comfort@salford.ac.uk)*

Our Sport and Exercise Science research covers a variety of sub-disciplines, including biomechanics, performance analysis, physiology, nutrition and psychology. We focus on two primary areas: optimisation of performance and the prevention and rehabilitation of sports injuries.

Performance Enhancement focuses on finding the most effective variations and types of exercise to help athletes attain their best possible performance, and identifying key performance characteristics of different sporting tasks and how to improve them.

Prevention and Rehabilitation of Injuries focuses on identifying the causes of common musculoskeletal injuries and screening to identify factors which may put athletes at risk of injury. We study various interventions to reduce these risks, along with identifying the best methods of rehabilitation post-injury.

Virtual Reality and the Mind

**Lead: Professor David Roberts** *(D.J.Roberts@salford.ac.uk)*

We focus on three main areas of research into virtual reality and the mind. Virtual Reality and Mental Health combines virtual reality and neuroimaging to induce and measure responses within the brain, which can be used to better understand and assist people living with dementia, phobias and post traumatic stress disorder (PTSD).

Interaction with Virtual Others studies people’s interactions with and reactions to avatars (an icon or figure representing a particular person in a computer game) and virtual humans, which can be applied to remote therapy and collaborative meetings situated within simulation.

Virtual Reality and Cognition measures attention, emotion and executive cognitive function of people immersed in simulations, such as scary situations or social encounters. This research informs mental health, telepresence technologies such as videoconferencing, and design.

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Physical Activity and Health

**Lead: Dr Steve Pearson**  (*S.Pearson@salford.ac.uk*)

Our aim is to improve or maintain quality of life at all stages of people’s lives. The research we carry out covers a broad spectrum of activity, with the goal of improving or maintaining health through a combination of physical activity and nutritional interventions in both health and disease.

Currently, we are involved in research to examine the responses of muscle and tendon tissues to various exercise interventions. We are also developing ways of examining the signals within the blood shown in response to exercise by people with conditions such as diabetes and obesity, and comparing these to a ‘healthy’ model. We look at the physiological and psychological effects of changes in diet on glycaemic responses, and are developing an understanding of activities and health in the workplace, such as posture and exercise. We are also investigating physical activity and optimisation of cardiorespiratory health, and the clinical and qualitative outcomes of knee surgery.

Clinical Gait Analysis

**Lead: Professor Richard Baker**  (*R.J.Baker@salford.ac.uk*)

Around 10% of all adults experience some difficulties walking. Clinical gait analysis is the process of making measurements to inform clinical decision making, with the aim of allowing people to walk more easily.

Our research programme focuses on two main research questions: firstly, why do we walk the way we do and why do our patients walk differently? We aim to answer this question by applying a rigorous understanding of biomechanics and testing this with experimental data.

How we can improve measurement techniques as a basis for deciding which interventions are best suited for each individual?

Current projects include developing a new biomechanical model for clinical gait analysis, understanding the energy efficiency of walking with an artificial limb and developing a motorised walker to train people to walk again after having had a stroke.

**Find out more**

www.salford.ac.uk/research/health-sciences/research-groups/gait-analysis

@RichardBakerUS
Occupational Therapy

Lead: Jo-Ann Webb (J.Webb@salford.ac.uk)

Our primary aim is to help people of all ages to achieve their full potential in their everyday lives, through the therapeutic use of meaningful and purposeful activities.

Later life, health and wellbeing researches ways of managing later life widowhood, the caring role and social relationships. We also look at community engagement to prevent loneliness and occupational deprivation and investigate environmental adaptation to maximize independence.

Work, leisure and occupational balance focuses on welfare to work and health related support for benefit recipients, as well as the process of re-engagement with leisure activities after serious illness or life-disruptive events have affected a person’s identity and wellbeing. We are also using a social media app to investigate occupational balance.

Our emotional intelligence (EI), service user engagement and leadership researchers are investigating EI in occupational therapists, and looking at ways of engaging service users collaboratively. The role of leadership and gender within occupational therapy as a profession is also being explored.

Find out more: www.salford.ac.uk/research/health-sciences/research-groups/occupational-therapy
@SalOTResearch
PhD, MPhil and MSc by research

By Dr Anita Williams, Director of Post Graduate Studies (A.E.Williams1@salford.ac.uk)

A number of routes are available to study with us, including full-time or part-time PhDs, PhD by published works, MPhil and Masters by Research. There are over 90 Post Graduate Research (PGR) students studying in our Research Centre, supported by researchers and academics who are world leading in their areas of expertise. Their varied experience ranges from laboratory based investigations and clinical trials, to exploring people’s experiences of health and health care. Our PGR students also have access to a wide range of training opportunities, as well as excellent facilities. The research training is tailored to particular needs and there will be opportunities to develop skills which will enhance employment opportunities.

Here are just a few examples of the breadth of the doctoral research currently being undertaken by our PGR students:

www.salford.ac.uk/research/health-sciences
Lara’s PhD

Lara Al-Khlaifat is a trained physiotherapist from Jordan and chose Salford because of its leading reputation in foot, knee and ankle biomechanics and its state-of-the-art facilities. Her PhD focuses on the development and testing of an exercise programme for patients who suffer with knee osteoarthritis. Using her clinical training, she delivered this intervention to 20 patients and subsequently assessed its impact on both pain levels and muscle/movement patterns. Her work has been published in the Journal "Knee" and was one of the first studies showing that muscle coordination patterns can be changed with effective physiotherapy. She is now a university lecturer in Jordan.

Alix’s PhD

Alix Chadwell is a Medical Engineer who is working with users of upper limb myoelectric prostheses; these devices can be opened and closed using muscle signals (or EMG). Her research aims to establish why some users find these high tech hands difficult to control. To do this, she has developed an innovative way to assess the capability of the user in controlling the muscle signals, and the ability of the electrodes to pick up these signals. Furthermore, she is assessing various clinical measures of functionality, and is collecting novel data reflecting the everyday use of the device outside the clinic. Her work will inform designers, clinicians and researchers who can then concentrate their efforts appropriately.
Lewis’ PhD

Lewis Atkinson’s background is in Sports Biomechanics. He is investigating how “4D” foot scanning technology can be incorporated to improve the existing design of foot orthoses which aim to improve function and mobility of people with various foot problems. Foot orthoses are normally designed based on a single foot shape captured when the foot is still. Innovative “4D” foot scanning technology enables foot shape to be captured when the person is walking, providing a description of how foot shape changes over a period of time. Ultimately, it is hypothesised that the information gained from multiple rather than single foot shapes will result in better “4D orthotics”.

Andrew’s PhD

Andrew Hodrien’s research aims to explore development of a method using Immersive Virtual Reality (IVR) to encourage prosthesis embodiment – the feeling of a prosthesis being part of the user. He is also working to identify factors which influence embodiment and various potential benefits which embodiment may provide a user, such as how a person feels about their body, their satisfaction with the prosthesis, and the use of the prosthesis. His research involves multiple studies, including interviewing prosthesis users to identify the factors associated with prosthesis embodiment, and experimental studies combining IVR with body ownership techniques, exploring the novel potential use for prosthetic rehabilitation.
Jo’s PhD

Jo Bragg’s PhD is focusing on adolescent alcohol misuse and is developing a universal school-based intervention that can be embedded into the curriculum. The aim of the intervention is to reduce alcohol consumption by influencing the attitudes of young adolescents as they make the transition into secondary education by using techniques to influence intrinsic motivation. It will also incorporate role play as a means of developing awareness of and attitudes towards alcohol. The intervention will be tested using a randomised controlled trial. It is hoped that young adolescents will adopt healthier attitudes towards drinking alcohol which will influence their future behaviour.

Raed’s PhD

Raed M. Ali is qualified in medical physics and diagnostic radiography, and is a lecturer at Kufa Medical Faculty in his home country of Iraq. The focus of his PhD is the radiation risk that women face from mammography during breast cancer screening. He aims to establish a novel method to determine radiation risk from full field digital mammography screening using ‘lifetime effective risk’ (the number of radiation-induced cancer cases per million). His method is characterised by the ability to consider the risk of radiation-induced cancer in all body tissues across all age groups and in different screening programmes and breast cancer risk categories (e.g. high risk of developing breast cancer). His research has the potential to influence any screening practice which uses X-ray.
IT IS HOPED THAT THIS STUDY WILL HELP PHYSICAL THERAPISTS, COACHES, AND TRAINERS TO EFFECTIVELY DEVELOP AND CONSTRUCT COMPREHENSIVE REHABILITATION PROGRAMS

Walaa’s PhD

Walaa Elsais is from Egypt and he is investigating the effect of real-time visual feedback on the running style of people with patellofemoral pain (PFP), which affects the knee and kneecap, and is the most common running-related injury. If the underlying mechanics associated with PFP are not addressed, then recurrence may result. It is hoped that this study will help physical therapists, coaches and trainers to effectively develop and construct comprehensive rehabilitation programs. Gait retraining via visual real-time feedback for runners with PFP may result in improvement of lower limb mechanics and running style. This hopefully will decrease the rehabilitation period and chance for recurrence.

Elsie’s PhD

Elsie Ong is an educator currently teaching in a University setting in Hong Kong. She is interested in understanding the recent increase in the number of students experiencing suicidal thoughts. Using electroencephalography (EEG) she is exploring frontal brain asymmetry associated with suicidal thoughts, with the aim of advancing our understanding of the cognitive and behavioural interactions associated with the formation of these thoughts. Elsie is using a range of cognitive tasks to assess differences in inhibition, working memory, and cognitive flexibility in undergraduate students with differing levels of suicide ideation.
We are proud that the research within our centre has a real, positive impact on the health of people living with a range of conditions, and also on the health providers with whom we collaborate.

Our research informs health policy, furthers the understanding of physical and mental health, improves the effectiveness of disease detection and diagnosis, and is helping to develop new technologies for rehabilitation. With more than £2.5M of direct investment from industry and partnerships, our research has been independently assessed and its impact was rated as considerable, with the impact on foot health having elements of outstanding reach and significance.

Self-management for people with arthritis

One in five British adults are currently living with arthritis, and the self-management of this condition is a key approach used by occupational therapists (OTs) to support them. Professor Alison Hammond has improved the tools available to OTs to enable them to deliver more effective self-management education to patients, in turn helping them to improve their quality of life.
Alison was a member of the NICE Guideline Development Group: The management of rheumatoid arthritis (RA) in adults, offering best practice evidence on the care of adults with RA. Her recommendations included allowing people with RA access to specialist Rheumatology OT for assessment, provision of comprehensive OT and periodic review if they have problems with everyday activities and/or hand function. Importantly, patients are taught joint protection and hand exercises using educational-behavioural approaches, not just simple advice. Rheumatology OT departments now set standards of service delivery based on these guidelines.

Alison has trained over 200 OTs, who are now better equipped to help patients manage their pain and fatigue, improve their psychological resilience, and remain in work.

**Foot health devices**

Professor Chris Nester and his colleagues have transferred their research findings in the foot health devices sector into products and services in commercial and clinical settings, supporting a £100 billion global healthcare equipment and supplies industry, and improving quality of life on a daily basis for those with foot and lower limb health problems.

Chris and his team have established highly valued partnerships with some of the leading companies in the foot health sector, with continuous funding contracts totaling an investment of £2M at Salford since 2008, and a further £0.5M in EU funds. They launched the salfordinsole brand in 2008, and since then more than 50,000 pairs of salfordinsole orthoses have been sold to the NHS and private sectors, with two overseas distributors appointed.

Chris and his colleagues have pioneered the connection of research to commercial foot health products and services, bringing credible and science led innovation in foot health devices to commercial partners and the market, contributing significant economic benefit internationally.
GET IN TOUCH

WE ENCOURAGE PROSPECTIVE STUDENTS TO CONTACT US SO THAT WE CAN PUT THEM IN TOUCH WITH SPECIALIST STAFF WITH WHOM THEY CAN EXPLORE THEIR RESEARCH IDEAS AND THE OPPORTUNITIES WE OFFER

For more information please contact:

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PGR-SupportHS@salford.ac.uk

For general Health Sciences research enquiries, email HSRC-Research@salford.ac.uk

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