

<b>Institution:</b> University of Birmingham
<b>Unit of Assessment:</b> 24 – Sport and Exercise Sciences, Leisure and Tourism
<p><b>1. Unit context and structure, research, and impact strategy</b></p> <p><b>1.1 Overview</b></p> <p><b>Our world-leading research enhances lifelong engagement in physical activity and optimises health and wellbeing in both healthy people and patient populations.</b> We achieve this mission by <b>combining world leading mechanistic science with evidence-based applied professional practice.</b> Our long-standing and sustained position in the field, combined with a breadth of expertise and strong partnership working, enable us to apply our research to address big contemporary challenges at local, national, and international levels. Through translation of theory and evidence, we effectively impact both practice and policy across the lifespan and within diverse populations. Our vibrant research environment, that articulates with major cognate disciplines on campus, provides us with a unique and dynamic platform to inspire novel, interdisciplinary and paradigm shifting research that informs change in society. Whether it is to improve recovery from stroke or enhance the health and performance of elite footballers, our key aim is to optimise quality of life, health, and wellbeing by advancing and translating knowledge on the mechanisms, determinants, and consequences of active living, sedentary behaviour, exercise, sport, rehabilitation, and nutrition.</p> <p>Since REF 2014, the rigor, reach and significance of our research has continued at a pace, empowered and enabled by our strategic location within the College of Life and Environmental Sciences (LES or ‘The College’) [REF5a 1] and our symbiotic relationship with colleagues and research institutes in the College of Medical and Dental Sciences (MDS). Our success is aligned with the University’s Strategic Framework “Making Important Things Happen” (2015-2020) [REF5a 2.1], and is demonstrated by:</p> <ul style="list-style-type: none"> <li>• Being awarded the Athena SWAN Silver Award in 2018 in recognition of our improved gender equality and good practice in developing a work-life balance policy (see section 2.1).</li> <li>• Being consistently positioned as a world-leading School in the QS University World Rankings for sport related subjects (ranked 5th in 2017 and 2018, and 6th in 2019 and 2020).</li> <li>• Creating “The Centre of Precision Rehabilitation for Spinal Pain” (CPR Spine), the first dedicated “hot spot” for spinal pain research in the UK. We have received significant investment (£799,000) to recruit new academic and research administrative staff (see section 1.2) and improve facilities (see section 3.3).</li> <li>• Leading the Mitochondrial Profiling Centre as part of the College’s Enabling Technologies Platform (see section 3.3).</li> <li>• Publishing 1451 Scopus-listed research outputs that have attracted 20992 citations and over 42000 views.</li> <li>• 52.4% of our research outputs being co-authored with international collaborators.</li> <li>• Winning £9,258,406 of research and business engagement awards (see section 1.2 &amp; 3.2).</li> </ul> <p>Our distinctive approach is realised through three interdisciplinary and interconnected research themes: <b>Exercise &amp; Health, Motor Control &amp; Rehabilitation, and Sport Participation to Performance.</b> These themes support concentrated areas of expertise that stimulate ideas and collaborations to fulfil our mission, with membership ranging from Post Graduate Students (PGR) and Postdoctoral Research Associates (PDRA) to Professors. Our themes exist to support individuals and groups to achieve their aspirations and stimulate dissemination and exchange through seminars, workshops, and pitch to peer activities. All staff are affiliated with at least one of these themes, and communication and active collaboration between themes is facilitated through extensive secondary theme memberships.</p>

**The Exercise & Health theme is focused on the determinants and effects of physical activity and nutrition in three key areas: Healthy Ageing, Metabolic Disease Prevention, and the Management of Chronic Disease and Disability.** It excels all the way from elucidating molecular mechanisms to leading complex community-based interventions promoting physical activity and enhancing the health and well-being of individuals and communities across the lifespan. Research and impact highlights during the REF period include:

- Enhancing insights into the molecular mechanisms of age-related muscle loss, resulting in new methodologies and the first multi-modal assessment to characterise muscle loss in patients with inflammatory diseases.
- Providing new evidence of the role of diet (e.g., flavanols, protein, vitamin D) and aerobic fitness in healthy ageing, including implications for cognitive and language functioning (e.g., hippocampal atrophy).
- A multi-centre trial illustrating the effectiveness of a community-based, low-resource, group-based exercise, and behaviour maintenance programme (REACT) in improving physical function associated with ageing in frail older people, sustained over at least 24 months.
- Advancing understanding of the effect of sedentary behaviour and physical activity on metabolic functioning, obstructive sleep apnoea, and cardiovascular health in individuals with, or at risk of, type 2 diabetes.
- Augmented understanding of the most effective behaviour change techniques for increasing physical activity in a range of patient groups, including people living with rheumatoid arthritis and multiple sclerosis.
- Leading the development of the Rehabilitation Enablement in Chronic Heart Failure (REACH-HF), a highly cost effective 12-week home-based cardiac rehabilitation programme for people with heart failure. Its effectiveness for generating sustained improvements in patient quality of life has led to it being rolled out through the NHS, with over 100 NHS staff trained to deliver it, and 1000 patients treated in 2020.

**Motor Control & Rehabilitation** performs innovative research addressing the major challenges to balance and movement presented by pain, trauma, disease, inactivity, and the ageing process. Research combines understanding of basic neurophysiology to clinical applications by focusing on: **Brain and Movement Control, Management of Musculoskeletal Conditions, and Neurorehabilitation.** Research and impact highlights include:

- Using non-invasive brain stimulation to combat the decline in motor performance seen in normal healthy ageing and pioneering the use of ultrasound brain stimulation to modulate eye movements.
- Advancing understanding of how the brain transforms vestibular signals into appropriate responses for balance, informing novel diagnostics for balance patients.
- Providing enhanced insights into the mechanisms underlying movement disorders – including Parkinson's Disease and cerebellar ataxia – through the use of robotics, virtual reality, and genetics.
- Progressing our understanding of the effects of musculoskeletal pain on human movement, and how to best intervene to ensure full functional recovery and improved quality of life.
- Pioneering the use of surface electromyography to show, for the first time, that individuals with low back pain use a less efficient motor control strategy.
- Designing and evaluating novel rehabilitation devices to enhance clinical reasoning and practice, through mechanistic interrogation of the underlying physiology.
- Using novel technologies (e.g., machine learning, robotics, psychoeducational approaches) to design, implement and enhance effectiveness of therapeutic exercise to improve function in patient (e.g., stroke) groups.
- Combining psychology, medical sociology, and physiotherapy to develop new clinical tools and storytelling approaches (around physical activity) for helping people to psychologically adapt to chronic and palliative illnesses such as Parkinson's Disease.

**Sport Participation to Performance** conducts research on critical and contemporary topics focusing on optimising engagement in sport and physical education and interrogates performance enhancement in competitive athletes and recreationally active populations. This theme draws on a long-standing global reputation in sports psychology, complemented by world-leading multidisciplinary expertise across physical education/pedagogy, physiology, nutrition, and applied sports science. This theme focuses on: **Enhancing Athlete Performance, Health and Well-being; Leveraging Sport for Social Justice and Health Equity; and Influencing Professional Practice and Policy in Sport and Physical Education**. Research and impact highlights include:

- Defining the factors influencing and stemming from Image and Performance Enhancing Drug (IPED) use (i.e., doping) in sport contexts, and subsequently developing and implementing two theory-based anti-doping interventions that target moral factors associated with doping.
- Providing new theoretical insights used to inform and promote practical guidelines in how to best deploy social media to develop, support and enhance healthy engagement with sport and physical activity in young people.
- Seminal research on motivational climates and empowering coaching strategies that has led to the development, implementation, and evaluation of the Empowering Coaching™ training programme to support the positive engagement of young people in sport. This research, along with the My Strengths Training for Life™ programme, is enabling this theme to address health and social inequalities in disadvantaged communities, including at-risk young people experiencing homelessness.
- Using our specialist expertise in stable isotope tracer methods to develop and demonstrate a new strategy to improve the use of dietary carbohydrates for exercise recovery and performance enhancement, producing nutritional guidelines for athletes and leading product development within the food industry.
- Working at the intersection of sport psychology and neurophysiology to enable elite athletes to build resilience against mental fatigue with a novel brain endurance training approach.
- Developing #opencpd, an innovative, accessible, evidence-based, career-long continuing professional development online resource that supports the professional learning of practitioners in physical education and youth sport.
- Reimagining continuing professional development of the Physical Education profession, particularly to adapt more inclusive and digital pedagogies.

## 1.2 Research Strategy

Our 2014-2021 Research Strategy, described in REF2014, married with UoB being a civic, global research-intensive University. It focused on five areas of action: **Building Critical Masses in Areas of Excellence, Developing Future Generations of Researchers, Capitalising on Strategic Investments, Growing and Diversifying Grant Income Portfolio, and Growing Research Influence, Reach and Impact**.

### **Building Critical Masses in Areas of Excellence (also see Section 2)**

Since REF2014, our research has been accelerated by strategic investment in new academic and research staff (from 64 to 75) across the career spectrum including 11 Lecturers (7 F, 4 M), 2 Senior Lecturers (2 M), 1 Reader (F), and 6 Professors (1 F, 5 M). Our hiring strategy has been to build critical mass around established (e.g., healthy ageing, metabolic disease prevention) and emerging (e.g., spinal pain) areas of excellence. This includes the professorial appointment of Falla in 2016 to spearhead cutting-edge research in rehabilitation, which was facilitated through the establishment of CPR Spine in 2017. We achieved this by capitalising on institution-wide centrally funded schemes [REF5a 3.4.1] to recruit talented research leaders who receive a dedicated period (e.g., 3 years) of research-only activity at the start of their appointment to drive forward our ambitions.

**Developing Future Generations of Researchers (also see Section 2)**

We provide an inspiring and supportive environment for the training and development of PGR students and PDRAs. Approximately 26% of our PGR students are from overseas, and we continue to attract high quality home students via competitive scholarships and training opportunities. We are active partners in three UKRI-funded doctoral training programmes (DTP), including the BBSRC-funded Midlands Integrative Biosciences Partnership (MIBTP) with Leicester and Warwick, the MRC-funded DTP in partnership with Nottingham and Leicester, and the Sport & Exercise training pathway for the ESRC-funded Midlands Graduate School (partners include Warwick, Aston, Leicester, Loughborough, and Nottingham). Staff (e.g., Wallis) have also been awarded BBSRC iCASE studentships to collaborate with industry. A Marie-Curie Innovative Training Network grant (i.e., **Physical Activity and Nutrition INfluences In ageing**, aka PANINI, €2,893,198) was awarded to Whittaker, Greig, and Thompson in 2016 to lead a European-wide research training network. PANINI provided multidisciplinary training and secondment opportunities to 11 early career researchers (classified as both PDRAs and full-time PGR students) over 4 years and involved eight universities and 20 European partners (i.e., academic, industry, health and third sector). This demonstrates our reach in stimulating collaborative and innovative ageing-related research and career development across Europe, ranging from basic science to clinical interventions.

**Capitalising on Strategic Investments**

There has been significant institutional and external investment in SportExR since 2014, as exemplified by the £799,000 from UoB's Dynamic Infrastructure Fund (DIF) [REF5a 2.1.2] to establish CPR Spine and £603,000 in funding from the Medical Research Council (MRC) to establish the Mitochondrial Profiling Centre (see Section 3). This enabled us to attract new academic and research staff as well as postgraduate students (e.g., CPR Spine has recruited 38 postgraduate students since 2017; 25 PhD, 13 MRes).

**Growing and Diversifying Grant Income Portfolio (also see Section 3.2)**

The growth and diversity in our staffing base has seen a marked increase in the total number and value of submitted research grants, resulting in the capture of £9,258,406 in new research awards. We achieved this by setting ambitious targets and enabling tailored support for the planning and execution of our grant pipeline. The grant pipeline involves specific grant application planning by each member of staff, which is discussed at the annual Personal Development Review (PDR) [REF5a 3.4.3] meeting and further refined throughout the academic year as needed. Completion and implementation of the pipeline supports effective workload planning, as well as timely and dedicated input from the College Research Support Office [REF5a 4.1] to optimise the quality of submitted applications. The income generated from the funded grants has enabled us to spearhead new initiatives as well as collaborate on ambitious and large-scale applications within, and external to, the University (see Section 3.2 for additional details).

**Growing Research Influence, Reach and Impact (also see Section 4).**

Our strategy has been to place value on how research impacts and transforms society beyond academia. We have focused on addressing major contemporary societal challenges, stimulating and fostering mutually beneficial long-term relationships (i.e., with industry, public sector, and third-sector partners), actively involving end-users and beneficiaries throughout the research process, and using policy and public engagement to translate the knowledge we generate. We actively encourage and support all our staff, both research and teaching-focused, to recognise the potential impact of our research and engage with internal funding mechanisms (e.g., ESRC and BBSRC impact acceleration accounts) to fund impactful activity. We also provide opportunities for PGR students and PDRAs to develop influential researcher skills, and embed impact within our research-informed curriculum for undergraduate and postgraduate taught students. This strategy underpinned our impact cases and supports the burgeoning portfolio of emerging areas of impact across our three research themes. This portfolio includes improving clinical decision-making tools for physiotherapists, pioneering behaviour change approaches used within the Birmingham (Primary Care Trusts) Exercise on Referral Scheme, the

development of patient-informed educational resources for Rheumatology outpatients for the benefit of 1,500+ patients, and creating new inclusive CPD opportunities for PE teachers.

### 1.3 Future strategic aims and goals for research and impact

The School's research priority is to firmly establish itself at the forefront of our field by growing the impactful, paradigm shifting, interdisciplinary research agendas we undertake in the UK and internationally to address key global challenges for health and well-being. Our focus will utilise integrative approaches that cut across disciplinary boundaries, enabling us to investigate complex issues in order to advance knowledge and impact on pressing issues such as physical inactivity, healthy ageing, chronic disease prevention, and mental health. This vision will be achieved through our embedded thematic structures and whole-school culture of impact, and by stimulating new interdisciplinary approaches via cross-thematic collaborations. We will also take a more directive approach to expanding our network of internal, regional, and international collaborations, and lead on major initiatives on campus including the development of a new Institute of Health and Wellbeing and Graduate School of Sport.

#### Beacon of Excellence for Community Health and Wellbeing

We seek to firmly establish the School's position as world leading in community health and wellbeing by spearheading the creation of a new transdisciplinary pan-University Institute of Health and Wellbeing. We will build on our considerable expertise in working with individuals and communities to improve quality of life. We will also leverage:

- Complementary expertise on social and political geographies, urban planning and wellbeing, and workplace wellbeing in the Schools of Geography, Earth and Environmental Sciences and Psychology within the LES College.
- Opportunities presented by The Exchange, the University's new city hub opening in 2021, to act as a catalyst for city and community-focused research and collaboration [REF5a 4.2.2]. The planned transdisciplinary approach will be enabled further through collaboration with all Colleges on Campus, to maximise the reach and impact of the Institute.
- UoB as an official partner of the Birmingham 2022 Commonwealth Games and legacy plans to use The Games to improve health and wellbeing of local communities.

We have already secured support to implement these plans through UoB's **Institute of Advanced Studies** [REF5a 2.3.2] and with QR-funded policy engagement research to bring research expertise and policy makers (e.g., our Impact Case Study – Informing Anti-Doping Policy and Education) together to co-create a world-leading research agenda. This Institute of Health and Wellbeing will serve to stimulate new community-University partnerships and provide us with a physical and virtual platform to address major societal challenges to health and wellbeing (e.g., physical activity, social exclusion, air pollution) using community-centred interventions and research. This new facility, as part of a planned £10M capital investment to refurbish UoB's Gisbert Kapp building, will provide new state of the art exercise spaces adjacent to various assessment suites, co-located with the Institute of Mental Health and the Centre for Human Brain Health [REF5a 4.2.3], and therefore ideally position the School to drive this transdisciplinary research agenda.

#### Increase the global reach of our Healthy Ageing agenda

We plan to build on our world-leading expertise in healthy ageing by moving into the global challenges research funding space and capitalising on Greig as Deputy Lead of the "Ageing, Frailty and Resilience" theme of the UoB's **Institute for Global Innovation** [REF5a 2.3.3]. We have already developed and tested innovative ways of increasing physical activity to reduce the consequences of ageing and promote physical and mental health in the UK (e.g., REACH-HF, REACT). With the ageing population posing a significant challenge for sustainable health and social care in low to middle income countries, we will take an interdisciplinary approach to tackle the causes, nature and implications of ageing and frailty within these societies and determine how to best create healthy, active communities, and reduce inequalities. We will do this by enhancing existing (e.g., PANINI network) and creating new international collaborations and

partnerships and stimulating innovative thinking on how to sustain physical activity across the lifespan and around the globe. A key enabler of this activity will be our plans to host a major health and wellbeing congress in concert with the 2022 Commonwealth Games.

### **Capitalising on engagement with elite sport**

We plan to build on long-standing relationships within the high-performance sector (e.g., PGA, National Institute for Dance Medicine and Science (NIDMS), and professional clubs such as Liverpool and Tottenham Football Clubs) and impactful research on coach education and PE strategies delivered by Griffiths, Goodyear and Makopoulou, alongside the world-leading *Empowering Coaching*<sup>™</sup> programme (see impact cases) through a new pan-University Graduate School of Sport (GSS). The GSS will enable us to innovate and develop collaborative solution-based research to solve real world performance challenges in elite sport, and provide microcredential, CPD and postgraduate training for those working in elite sport. The GSS will take a multidisciplinary approach to designing and optimising performance solutions within an adaptive psychological environment (i.e., performance that does not come at a welfare cost for athletes, coaches, and sport science and medicine professionals). The first stage towards the GSS was the launch of our Sports Science Professional Doctorate programme in 2020, spearheaded by Drust, which enables us to empower an increased number of professional doctoral students to research alongside their “day-jobs” to impact change in elite sport settings (e.g., sport psychologists, physiotherapists).

### **Maximise the impact of our research**

We have a strong commitment to ensuring that our research has a meaningful benefit to society and will use our new research strategy to continue embedding impact and engagement in everything we do. We initiated this culture shift in our previous REF strategy, by engaging stakeholders as an essential part of our research, from the formulation of ideas to the translation of knowledge. The appointment of our Industrial Professor and Business Engagement Champion (Drust) sustains this focus, which will be developed further in the coming cycle by:

- Enhancing and embedding the engagement of stakeholders across a wider variety of our research by providing more forums and mechanisms to exchange ideas and be involved earlier on in decision-making processes.
- Supporting staff and PGRs to develop their skills in knowledge translation and impact evaluation by providing mentoring, encouraging them to apply for institutionally managed funds to support impact (e.g., ESRC & BBSRC IAAs), signposting to central levels of support (e.g., policy affairs, public engagement), and celebrating impact success in school meetings and communications.
- Take a more directive approach in forming partnerships and arranging debates and discussions on major health and well-being issues at national and international levels.

### **1.4 Open Research**

Since 2014, our School has improved our compliance with the UKRI Concordat on Open Research Data: staff upload accepted articles and book chapters onto PURE (i.e., the institutional repository for sharing our research with the public), ensure all appropriate grant applications have funding costs for open access publications, and apply for institutional funds to cover article processing charges for non-funded research outputs. To build a more open research environment and develop the next generation of open researchers, we also:

- Encourage all staff and PGRs to have an ORCID iD, a Scopus ID and claim their publication record on Web of Science. 100% of our Category A staff have an ORCID iD.
- Offer Influential Researcher workshops to staff, which include personalized recommendations to attendees based on a review of their online presence by Library staff.
- Provide training to PGRs on how to write Data Management Plans (DMP) and provide access to DMPOnline for this purpose.
- Provide staff with an online repository of resources (e.g., a template communications plan) to assist them with communicating their research to non-academic audiences.

- Consider knowledge translation as part of our EDI work by improving access to research outputs to disadvantaged communities. For example, Cumming's project website ([www.sprintproject.org](http://www.sprintproject.org)) provides open access papers, policy briefs, interactive online tools, infographics, and blogs to communicate research for young people experiencing homelessness, frontline staff, and services.

### 1.5 Research ethics and integrity

We maintain the highest standards of research integrity within our School via adherence to the five commitments outlined by the UK National Concordat and the University's Code of Practice for Research [REF5a 2.2]. Our staff have leadership roles in University infrastructure to support research integrity. Greig is Chair of the University Science Technology Engineering and Medicine (STEM) Research Ethics Committee (REC) and sits on the Clinical Trials Oversight Committee; Wallis is the LES College lead on Human Tissue Oversight, and the LES College compliance officer (Pugh) is also based in our School. All PGR- or staff-led projects are reviewed by the University STEM and NHS RECs as appropriate and have access to online training in research ethics and integrity and responsible conduct in research. A considerable amount of our research falls under the UK Policy Framework for Health and Social Care Research, and researchers are supported via the University Research Governance team, who provide formal responsibility for supporting ethics, quality, and management of research via University sponsorship. We have robust ethical review procedures at a School level for UG and PGT research projects via the School REC and embed research integrity into our UG and PGT programmes from the outset. A Research Misconduct and Whistle-Blowing Policy and Procedure further ensures maintenance of a culture of research integrity. During the COVID-19 crisis, School REC, Health & Safety, and other key staff worked together within a task and finish group to restart research according to College, Institutional and national guidance structures. As a signatory of the San Francisco Declaration on Research Assessment (DORA) [REF5a 2.2], UoB has also made a strong commitment towards promoting fair and ethical research assessment; the principles are followed at a School level, ensuring fair and transparent assessment of research outputs.

## 2. People

### 2.1 Equality, Diversity, and Inclusion

To deliver 'Research that Matters' [REF5a 3.1] and secure our position as 'the place to be' for Sport, Exercise and Rehabilitation Sciences, we have created a School culture 'that stimulates, nurtures and engenders drive, confidence and ambition'. A core value underpinning the execution of our strategy is that equality, diversity, and inclusion (EDI) are vital to world-leading research as **evidenced by our Athena SWAN Silver Award in 2018 at School level, and engagement with the Race Equality agenda**. We actively embed these principles into our research culture to create an inclusive atmosphere for attracting and maintaining the best talent, nurturing transformational ideas, and ensuring that everyone feels valued, supported, and is treated with respect.

#### 2.1.1 EDI Infrastructure and Initiatives

The School's firm commitment to EDI is evident through its structures and processes. Since REF 2014 and receiving our Athena SWAN Bronze award in 2015 (with Silver in 2018), we have introduced a dedicated EDI committee that develops, monitors, and implements strategies for all protected characteristics, and is represented on the Senior Management Team and School Executive Committee (i.e., decision-making body). EDI is now a standing item on all School Committees, and the School has introduced a dedicated budget for EDI activities and a quarterly School EDI Newsletter.

We have specific initiatives in place to increase diversity and promote an inclusive research culture for all staff and students, including our work-life balance policy which has been adopted as good practice by the College. Our annual School Staff Survey is in addition to the annual UoB staff survey, and has a strong focus on monitoring staff work-life balance, which is a high priority for the School Management Team, particularly in light of the COVID-19 pandemic. We

introduced a workload allocation model (WAM), which is used by the Head of School to monitor equity and set workload patterns, as well as to inform promotions and provide support for staff work-life balance. For example, we adjust our workload model for staff who are facing periods of acute pressure or personal distress and offer additional research support where possible. The University covers replacement staff for parental leave, and we ensure this includes an overlap period pre- and post-leave to ease the transition back to work. Staff are also active members of the University Female Professor Network, Parents and Carers Network, and the Rainbow Network [REF5a 3.4.5].

### 2.1.2 EDI in REF Submission

Aligned with the University's code of practice, we considered EDI in the construction of our REF 2021 submission, with specific processes put in place to review the selection of our output portfolio and monitor the distribution of outputs across the staff according to key characteristics. We undertook an equality impact assessment to compare the contributions of staff with protected characteristics and across different career stages. This analysis showed that the initial automatic algorithmic allocation led to an underrepresentation of female staff. In response, manual adjustments (overseen by the Head of School [HoS], Head of Research [HoR], Deputy Head of Research [DHoR], and REF Outputs Lead) were made to the submission to achieve a more gender-balanced output portfolio whilst maintaining the quality of the submission. In our selected outputs, the % of outputs attributed to staff across gender, age, ethnicity, and contract type and mode are therefore consistent with the staff profile.

### Staffing strategy

Our staffing strategy has been to: (1) build capacity and areas of strength within and between themes and across career stages (see Section 1.2); (2) grow the number of PDRAs via externally funded research positions; and (3) ensure development, retention and advancing the careers of academic and research staff. The success of this strategy is exemplified since 2014 by:

- Four Birmingham Fellow [REF5a 3.4.1] appointments, including: one early career Birmingham Fellow (Lai) with expertise in the molecular biology of ageing; two Birmingham Professorial Fellows (Greaves, Holm) to extend our direction in health behaviour change and ageing and protein metabolism; and one Birmingham Professorial Industrial Fellow (Drust) to create stronger links with professional sport and University Birmingham Sport, and drive forward our ambition to establish a Professional Doctorate programme in applied sport sciences.
- The successful recruitment of 20 academic staff on open-contracts, enabling us to reduce our staff-student ratio from 22.4 to 16.8 and resulting in additional time to strengthen the quality of research, increase grant income, and mentor staff and PhD students.
- More than doubling the number of PDRAs, with three of these staff progressing to open contracts at the level of Lecturer (Fenton, Macdonald, Martinez-Valdes).
- Maintaining high staff retention rates of 94.3% (5-year average).

**To promote EDI in our recruitment practices**, we target female, BAME and other underrepresented characteristics with the aim of appointing a more diverse staff. We also:

- Use inclusive job advertisement, job selection, and interview processes.
- Include an EDI statement in all job advertisements.
- Use gender-neutral and gender-balanced language in job applications and on our School website.
- Involve female staff in all recruiting and hiring processes.
- Require all staff to undertake the University's Diversity in the Workplace course, and appointment panel members are also required to complete Unconscious Bias training.
- Offer flexible and remote working opportunities.

The impact of these actions has seen a 230% increase in job applications from females between 2014 to 2017, compared to a 41% increase from males in the same time period. We now have a



consistent near gender parity in job applications (3-year average = 50%F:50%M) and the School has a higher % of females being shortlisted and appointed across the cycle (3-year average = 56%F:44%M for shortlisting; 55%F:45%M for appointments). The gender ratios of staff have also been brought closer to parity (academic & research staff = 45.3%F: 54.7%M) and are relatively even across the range of career levels (e.g., 4 female and 5 male Professors). Our proportion of BAME staff remains low and addressing this is a key future priority for the School.

### **Staff development and progression**

Academic and research staff are fully supported to develop their research expertise through consistent, effective mentoring and development at all career stages. Newly appointed lecturers complete a three-year probationary period in which research is prioritised by a graded reduction in teaching load (70% reduction in Year 1 to 20% in Year 3). During this period, they also complete the Post Graduate Certificate in Higher Education (PGCE). Newly appointed staff (all levels) are given a comprehensive induction [REF5a 3.4.2] along with equipment and consumable start-up packages (ranging from £10K to over £100K – total £909,530 since REF2014), and dedicated workshop and technical support.

All academic staff:

- Are eligible for 6 months of study leave to develop their research (nine staff representing different career stages had a study leave since REF2014).
- Can apply to the School for up to £750 per year to support career development.
- Participate in an annual PDR with a senior member of the School to ensure that clear research and career development objectives are set, agreed, and monitored [REF5a 3.4.3].
- Are offered peer-to-peer mentoring and professional performance coaching opportunities provided by the UoB's People and Organisational Development team.
- Have continuing professional development opportunities [REF5a 3.4.4].
- Can access an Equalities Travel Support Fund of up to £500/year, which covers the cost related to childcare or caring responsibilities incurred when travelling for research or impact.

**To support staff to develop their research impact**, the School Head of Impact and Knowledge Transfer provides one-to-one coaching, organizes impact focused workshops and seminars, and raises awareness of impact through School fora. Staff are signposted towards funding opportunities for research impact, as well as receiving support from UoB's professional services staff. The University Public Engagement with Research team delivers a monthly 'Breakfast Brainstorm' drop-in session for researchers to discuss impact. We are also supported by the Public Affairs team on how to write policy briefs and engage with policy makers and Parliamentarians.

Since REF2014, we have improved our resource engagement and impact activities:

- Staff have received £36k in LES College financial support and £78k in ESRC IAA funding since 2014.
- Staff leading impact agendas receive recognition in their workload.
- Impact achievements are now recognised in promotion applications and are celebrated and acknowledged through School communication channels (e.g., website, social media, and press releases). Staff are also nominated for the University's Outstanding Contribution to Research Impact Awards. All four of the School's REF2021 impact case leads have been shortlisted for these awards; Goodyear won in 2019 for Outstanding Impact in Society.

**We offer leadership development opportunities appropriate to career stage.** More than 10 staff have benefitted from UoB's leadership programmes [REF5a 3.4.4], including Emerging Leaders, Senior Leaders and Research Leaders, as well as from programmes dedicated to promoting leadership across our BAME and female staff (e.g., Aditi, Aurora). These opportunities are advertised to all staff, and the transparent process used to select nominations

is monitored by our EDI committee. Our staff are also encouraged to take on senior leadership roles outside of the School, with eight staff holding College level roles and two holding University level roles since 2014 (e.g., Aldred is the Director of Post Graduate Studies for the University). Former Head of School (Armour) is now the University's PVC for Education. Over this REF period, females have occupied all senior leadership positions in the School. These include HoS (Armour, Thompson), HoR (Cumming, Thompson), Head of Education (Aldred, Burns), Head of Quality Assurance (Burns), Head of Post Graduate Research (Veldhuijzen van Zanten, Kavussanu), Impact Lead (Duda, Thompson), Head of Equality and Diversity (Cumming, Stathi), and Research Theme Lead (Greig, Stathi).

**We provide enhanced individualised support for staff applying for promotion.** Since REF2014, we have introduced peer-reviewing of promotion application forms, mock interviews, and workshops. We also provide staff with examples of successful applications and CVs, and use the annual PDR process to actively encourage female and BAME staff to apply for promotion. The effectiveness of this strategy has led to four staff being promoted internally to Chair (1 M, 3 F), seven to Reader (3 M, 4 F), and 13 to Senior Lecturer (8 M, 5 F) since 2014, including double promotions for five staff in this period. This has helped to improve the senior profile of female staff and the School now has a 62% success rate for promotion applications, reaching near gender parity (61% females, 64% males).

#### 2.4 ECRs and PDRAs

Our ECRs (i.e., research fellows) and PDRAs are fully integrated into the School as part of the staff and embedded within our thematic structure. As part of our EDI agenda, we adhere to Concordat recommendations ensuring that they are offered significant opportunities to develop their careers and become full members of the academic community. Tailored professional development activities are offered through the Postdoctoral/Early Researcher Career Acceleration Training (PERCAT) scheme, which is a College level support and career development programme specifically for PDRAs [REF5a 3.3]. Examples include participation in the annual PDR process, regular formal and informal mentoring by senior staff, and workshops on careers in higher education/industry, funding opportunities, public engagement, science communication skills, and understanding impact. Internal funding is available to support conference attendance, pilot work and impact events. PDRAs are invited to whole school meetings and events, sit on research related committees in the School (e.g., School Research and Knowledge Transfer Committee) and at the College/University levels (e.g., University Ethics), and are routinely involved in PGR supervision.

#### 2.5 PGR students

The School has a vibrant postgraduate researcher (PGR) community. The attractiveness of this environment is attested to by the increasing numbers enrolled (**Table 1**). To support research students, staff have been successful in attracting funding for PhD studentships from a wide range of sources including BBRSC MIBTP, ESRC, MRC, ARUK-MRC centre, NIHR Surgical Reconstruction and Microbiology Research Centre, HEE/NIHR Clinical Doctoral Research Fellow, the EU, and the University (e.g., Richard Fenwick Scholarship & Elite Funding). UoB also provided five fully funded studentships to promote Exercise as Medicine research, and our postgraduate community has been enriched by recruitment of both International self- and government funded students across this REF cycle. PGR students have representation on College and School Committees (e.g., Health and Safety Committee), and the PG Student-Staff Committee is chaired by a doctoral student.

**Table 1.** Full-time (FT) and part-time (PT) number of Home (H) and International (I) PGRs enrolled on doctoral programmes in the School.

Population	2013/14		2014/15		2015/16		2016/17		2017/18		2018/19		2019/20	
	H	I	H	I	H	I	H	I	H	I	H	I	H	I
FT	46	25	43	32	50	27	55	29	51	26	58	31	65	25
PT	17	0	21	0	22	0	20	0	19	1	23	2	29	2
<b>Total</b>	<b>63</b>	<b>25</b>	<b>64</b>	<b>32</b>	<b>72</b>	<b>27</b>	<b>75</b>	<b>29</b>	<b>70</b>	<b>27</b>	<b>81</b>	<b>33</b>	<b>94</b>	<b>27</b>

Competitive recruitment is followed by highly structured supervision arrangements. Each incoming PGR student is assigned a senior PGR student as a mentor and at least two staff supervisors. Formal meetings are held minimally once per month to monitor progress and set goals, and formal training is provided in generic and discipline-specific skills within and beyond the School. PGR students are given regular informal opportunities to present their work internally, including the School's annual PGR Day, and offered financial support for attending and presenting at national and international conferences.

All PGRs engage twice per year in the Development Needs Analysis process to assess immediate and longer-term training requirements in personal effectiveness, research governance, and the impact agenda, as well as in discipline-specific knowledge and methodological 'know-how'. Extensive in-house training is provided by School staff throughout each PGR's programme of study. The University's Graduate School also offers over 40 development courses to enhance research and teaching skills [REF5a 3.2]. Support for international students is provided by the International Students Advisory Service (ISAS), English for International Students Unit (EISU), and Counselling and Guidance Centre. Finally, the ESRC/BBSRC/AHRC Doctoral Training Centres offer funded students the chance to complete a Post Graduate Certificate in Advanced Research Methods and Skills (PGCARMS).

Progress toward degree completion and broader development is monitored in a formal, individual Annual Progress Review conducted by members of staff on the PGR Committee, in collaboration with the University's Graduate School. In this REF period, 91 PGR students have completed their degrees. Due to the COVID-19 pandemic, contingencies have been put in place to mitigate the disruptions that PGR students have faced during their studies, including being supported to amend research plans, apply for extensions, and a formal process for declaring the impact of the pandemic on the quantity and scope of their thesis. The needs of PGR students have been fully considered in the resumption of research following periods of restricted activity due to national lockdowns, with PGR students being among the first to access laboratory and office facilities.

As a key indicator of research quality, PGRs regularly publish their research in leading journals as first author. They have also been awarded an impressive number and range of prizes over the assessment period, including student research conference presentation awards from >12 learned societies such as the American College of Sports Medicine, European College of Sport Science, and the International Society of Electromyography and Kinesiology. PGRs have also been awarded external funding to attend international conferences and workshops, including support from Cambridge Cognition CANTAB and the British Council.

### **3. Income, infrastructure, and facilities**

#### **3.1 Research and Knowledge Transfer Infrastructure**

The HoS is responsible for resourcing the School's research environment and leads this agenda through the School Executive and Research and Knowledge Transfer (R&KT) Committees. The HoS sits on the senior management team of the College, and the HoR sits on the College-wide R&KT Committee. As such there is seamless alignment of the School with not only the College research strategy, but also with the key research objectives and targets contained in the University Research Strategy through to 2026 [REF5a 2.4].

The size and shape of the School's research effort is strategically orchestrated and planned through the delivery of a Vision, Mission, Objective, Strategy and Tactic process that is overseen by the School Executive and owned by all staff. This live document sets the direction of travel and empowers the HoR to develop and implement strategies that build a team ethos and culture which enable the achievement of our research goals. The School R&KT Committee oversees and monitors research activity, evaluates, stimulates, and promotes knowledge translation and impact, and drives reputational profile.

### 3.2 Research Income

To diversify our funding portfolio and strengthen our resilience to economic challenges over the census period, we have increased the number and value of our applications, increased the number of research-active staff applying for awards to 79%, and increased the average £/FTE to £53,400. We are now attracting income from a wider range of research funders over this REF period:

- >£2M in UKRI awards (e.g., AHRC, BBSRC, ESRC, EPSRC, MRC, NERC)
- >£500k from EU Government; >£2M from NIHR; approximately £500k from Local and Central Government (e.g., Birmingham City Council & Public Health England)
- >£2M from charities, foundations, and national/international governing bodies (e.g., Archery GB, Dunhill Medical Trust, MS Society, Nuffield, Sport England, The Football Association, The Wellcome Trust, UEFA, London Marathon Charitable Trust, World Anti-Doping Agency)
- >£500k from industry (e.g., Bristol Myers Squibb Pharmaceuticals, Dairy Management Inc., Elysium Healthcare, Lucozade Ribena, Octagon).

To enable our external funding activity, we have introduced new processes for supporting staff to achieve funding success, including a grant pipeline (described in Section 1.2) for better planning and monitoring of funding applications, an internal grant peer review scheme, and a pitch-to-peer scheme to enable staff to receive early-stage feedback on their ideas. Staff have also benefitted from a wide range of internal support mechanisms, principally at a College level:

- Dedicated Research Support Services staff who identify funding opportunities, provide technical reviews of grant applications, act as 'critical friends' on mock grant interviews, and coordinate bids [REF5a 4.1].
- Dedicated Business Engagement Partner and the University of Birmingham Enterprise technology-transfer team who assist with the development of commercial partnerships and helping academics make links with industry [REF5a 4.1].
- Development and Alumni Relations Partners who provide support for curating relationships with charities and funding applications [REF5a 4.1].
- Internally held funding opportunities, including research funds from the Institute of Global Innovation [REF5a 2.3.3], critical data awards from the Wellcome Trust Institutional Strategic Support Fund (ISSF), and joint research funds between UoB and the University of Illinois at Urbana-Champaign (BRIDGE initiative) to promote new international research relationships [REF5a 2.1.8].

### 3.3 Facilities

The School is housed in a 2200m<sup>2</sup> state of the art research facility (SRIF2-funded) that has enabled innovative and transformational research to impact society. UoB has invested over £1.2M in infrastructure over the REF period, including refurbishment of Physiotherapy/Rehabilitation research space (£145k) and the purchase of the Xevo TQXS Mass Spectrometer (£200k). Key facilities developed since 2014 are detailed below. These are linked to achieving our research mission and strategic objectives, including growing areas of research strength, and capitalising on investments (see Section 1.2).

**CPR Spine** was established with a UoB Dynamic Infrastructure Fund [REF5a 2.1.2] investment (£799,000). In addition to investing in new academic and research administrative staff, the funds were used to develop a dedicated facility to promote interdisciplinary research by incorporating 3D kinematic reconstruction and analysis of human movement, quantitative sensory testing, electromyography, elastography, ultrasonography and electroencephalography, and signalling processing techniques. Under the direction of Falla, this facility also includes a BTE MCU Multi-Cervical Unit to assess and rehabilitate patients with neck and cervical spine pain.

**The Mitochondrial Profiling Centre** was created during this REF cycle with investment from MRC and DIF (£603k), enabling UoB to be one of only two organisations in the UK with the capacity to conduct high resolution respirometry for mitochondria-related research. The facility is

located within the School under the direction of Lai, and forms part of the College's enabling technologies group of facilities. It provides researchers and clinicians access to state-of-the-art platforms (i.e. Oroboros O2K-FluoRespirometer, Agilent Seahorse Extracellular Flux Analyzer) that enable measurements of cellular respiration reactive oxygen species production, mitochondrial membrane potential, ATP production, and calcium and pH in a variety of samples from whole pieces of tissue or fibres to suspended and intact cells or even isolated mitochondria. This technology enables researchers and clinicians to detail mitochondrial activity in parallel to monitoring nutrient metabolism in a variety of clinical scenarios such as obesity, liver disease, atherosclerosis, sarcopenia, sepsis, and trauma. The Mitochondrial Profiling Centre has stimulated new collaborations with the University of Nottingham and Liverpool John Moores University and helped to secure funded PhD studentships via the BBSRC MIBTP.

Our **Environmental Chamber** was upgraded over this REF period to include high-altitude simulation capability (£110k). This facility couples a wide array of invasive and non-invasive respiratory, thermal, and cardiovascular assessments to enable researchers to interrogate the impact of the environment on performance and health parameters. Under the direction of S. Lucas, the Environmental Chamber has attracted >£1.2M in external funding and supported new collaborations with the School of Psychology and external partnerships (e.g., Birmingham Medical Research Expeditionary Society, US Army Medical Research and Development Command).

Other key facilities housed within the School that enable exciting and transformational research include:

- Calorimetry and a metabolic kitchen, including DEXA body composition analysis and kinanthropometry.
- Cardiopulmonary, cerebro- and skin vascular assessments (e.g., echocardiography, peripheral Doppler, end-tidal clamping, peripheral and cerebral fNIRS, lung mechanics and function).
- Psychophysiological assessment suites, including stress reactivity and blood pressure assessment.
- Molecular and cellular biochemistry, including stable isotope mass spectrometry, western blotting, elysa technologies, pCR, cellular and tissue culture suites and vesicle proteomics.
- Whole-body linear and rotational acceleration equipment for study of balance and vestibular activity.
- Electrophysiology and navigated brain stimulation equipment, including transcranial magnetic stimulation.
- Muscle dynamometry and integrated EMG, across all key movement planes.
- Clinical assessment of gait including kinetics and kinematics of movement through 3D motion capture and integrated force plates, transducers, and strain gauges.
- Dedicated research laboratories for real-life sport/motor tasks with display facilities for 4 x 4m life-size stimuli.

We also make extensive use of the newly opened Centre for Human Brain Health (CHBH) [REF5a 4.2.3], the Institutes of Mental Health and Microbiology and Infection, and the Enabling Technologies Platform within LES College. For example, School staff were part of the working group that helped to establish CHBH and now sit on the management committee and lead labs (e.g., S. Lucas, Jenkinson). This facility includes a new generation 3T MRI full body platform that enables high spatial resolution head-to-toe imaging along with a Neuromag TRIUX magnetoencephalography system, functional near infrared spectroscopy, and non-invasive brain stimulation. CHBH has helped to support collaborative opportunities with international partners, such as Rendeiro's BRIDGE-funded study on the use of dietary flavanols to improve cognitive functioning in older adults with collaborators from the University of Illinois.

Our well-established links and active collaborations with Birmingham Health Partners [REF5a 2.1.3], a strategic alliance between UoB and two NHS Foundations Trusts (Birmingham

Women's & Childrens', and University Hospitals Birmingham) supports our interdisciplinary research mission and provides pathways to translation and impact. This, in combination with the Wellcome Trust Clinical Research Facility (WTCRF) at the Queen Elizabeth Hospital, provides us access to additional facilities that include an outpatient area, inpatient beds, procedure and consultation rooms and day-case beds for infusions. The School also uses the WTCRF's Health Research Bus (HRB), a fully functioning mobile research facility to enable assessments in the community including a dedicated DXA scanner for measuring body composition and bone mineral density. We have established links with the Cardiac Rehabilitation (CR) service based at City Hospital Birmingham, and Sandwell and West Birmingham NHS Trust (SWBH). As part of the MRC-ARUK Centre, our mass spectrometry laboratory is twinned with the stable isotope mass spectrometry facility at the University of Nottingham, providing School staff with access to one of the most comprehensive metabolic profiling systems in the UK. Finally, we are an active participant in the Midlands Innovation [REF5a 2.1.5] equipment sharing initiative, between the Universities of Nottingham, Leicester, Warwick, Aston, Loughborough, Keele, Cranfield and Birmingham, which has been a platform utilised by our MIBTP students.

#### 4. Collaboration and contribution to the research base, economy, and society

##### 4.1 Contributing to economy and society

Over the REF period the School has made and is making major contributions to our global community. We are optimising the benefits of digital technologies/social media for physical activity (Goodyear, Griffiths, Makopoulou, & Armour) and enhancing doping prevention and education (Boardley & Kavussanu). The *Empowering Coaching*<sup>TM</sup> training programme is transforming the practice of coaches and teachers, as well as enhancing participation and well-being amongst young people in sport and educational settings (Duda & Appleton). The translation of applied sport psychology via My Strengths Training for Life<sup>TM</sup> is improving well-being and social inclusion amongst young people who are at-risk and/or experiencing homelessness (Cumming, Duda, Burns, & Thompson). This world-leading work is set out in detail in our Impact Case Studies, which represent just some of the ways we are doing research that matters.

**We also promote a culture of School-wide impact and are committed to addressing big contemporary societal challenges beyond our Impact Cases. Our research themes incorporate all research and teaching-focused staff, directing and stimulating their engagement with impact-focussed activities.** They provide developmental opportunities for PGR students and early career researchers and help embed impact within our research-informed curriculum for undergraduate and postgraduate taught students. We also work in collaboration with key stakeholders to define problems, provide practical solutions and translate theory and evidence into practice, to co-produce research that has local, national, and international impact and reach. Our wide-ranging partnerships involve working with industry, government, and public services, and the third sector (see key partners listed in Section 3.2). For example, Thompson formed a partnership with Diabetes UK in 2016 to identify a framework for evaluating the impact of their Community Champions initiative. This initiative trains adult volunteers living within high-risk, ethnically diverse, and socially deprived communities to raise awareness and educate people in their local community about lifestyle changes to prevent and manage diabetes. The evaluation led Diabetes UK to changing the training provision needed to enhance Champions' ability to effectively reach and engage high-risk communities.

We are **responsive to national and international priorities**, a common thread that interconnects our research and teaching. Stathi, Greig, Fenton and Veldhuijzen van Zanten recently contributed to the Chief Medical Officer's (CMO) 2019 revision of the UK Physical Activity Guidelines as members of three Expert Working Groups (i.e., older adults, adults, sedentary behaviour). Fenton and Goodyear were also appointed to the CMO's UK Physical Activity Expert Committee in 2020. In addition, our curriculum is designed to train the next generation of engaged researchers through our unique Civic Engagement dissertation, whereby final-year students complete a project and 50 hours of volunteering with a local organisation (e.g., Golf Foundation, School Games), culminating in a final report outlining evidence-based

recommendations.

Our policy engagement strategy is to **influence and shape decisions on how the health and well-being of society can be improved** by engaging with policy-influencing stakeholders (e.g., Public Health England), from co-designing research to providing evidence and recommendations to inform policy decisions. B. Lucas is working with internationally based NGOs (La Isla network & Bonsucro) to influence policy on sugar mill working conditions in Central America to prevent agricultural workers developing Chronic Kidney Disease of non-Traditional Causes (CKDnT) which can be fatal. Four of our staff have provided evidence and policy briefs to The House of Commons, House of Lords, the Cabinet Office, All Party Parliamentary Groups (e.g., Young People, Social Media, and Mental Health), and key government departments (e.g., DCLG, DWP) and policy units (e.g., No 10 Policy Unit). Duda has served on the Department Digital, Culture, Media, & Sport Scientific Advisory Committee. Greaves contributed to the British Psychological Society Obesity Task and Finish Group and co-authored the new policy statement that was published in September 2019. Boardley has been co-opted onto the UK's Advisory Council on the Misuse of Drugs working group that is reviewing the evidence of harms relating to cognitive enhancing drug misuse and making policy recommendations on regulation of their use. Chen was invited to sit on a United Nations Expert Group to provide direct input into policies and policy recommendations for the use of sport in development and peace programmes. Wallis is working with the US Military to develop optimised ration packs to sustain performance of military personnel in extreme environments. We also extended our policy links by signing memoranda of understanding for research with national and international stakeholders. These include the Sports Authority of India, who are working with our School to increase capacity building and provide professional development opportunities for Indian sport coaches. In addition, we are working with the Commonwealth Federation to enhance coach education when hosting coaches and athletes from OECD nations in their preparation for the 2022 Commonwealth Games.

**We actively involve the public in the design and management of our research**, including serving as members of project advisory and steering groups. Makopoulou trained students as researchers who went on to interview peers and teachers, putting them at the centre of redesigning an inclusive physical education curriculum, whereas Boardley has helped train athlete researchers in five EU countries. Cumming incorporated St Basils (a charity and registered housing authority in the West Midlands working with young people 16-25 years of age who are homeless, or at risk for homelessness) as co-applicants on grant applications and involved young people from Youth Voice, a national advocacy group for young people experiencing homelessness, in developing toolkits and guidance for frontline support staff. CPR Spine has developed the Spine Register, a database of 110 individuals with neck, mid-spine, and low-back pain to shape research design and facilitate both the communication of research findings and participation in projects designed for their benefit.

We also **prioritise the translation of knowledge in open and accessible ways** by participating in the organization and delivery of public events (e.g., UK Science Festival, ESRC Festival of Social Sciences). Staff regularly write blog posts and articles for the Conversation, Birmingham Brief, and Birmingham Perspective, as well as for their own project websites. Stathi and the REACT study team developed a blog during COVID-19 lockdown on "Staying Active in Older Age", which includes practical exercise tips and nutrition information for people aged 60 and over, to help them stay active and support their health even when in isolation. Kavussanu's research on doping prevention has been translated into an infographic by WADA, whereas Wallis helped to create a series of public-facing online videos produced and disseminated by the IOC Diploma in Sports Nutrition.

Our research receives **widespread media attention**, with staff regularly appearing in print, radio, and television media, as well as communicating their research through the School's twitter feed and website. Chen was interviewed for the Wall Street Journal on the impact of COVID-19 on China's Olympic preparations and has also written for the Hong Kong Free Press. Stewart is a TEDx speaker who has been interviewed on BBC radio and appeared as an expert in both seasons of the BAFTA-nominated and Grierson Award-winning "Old People's Home for 4 Year

Old's". The TV programme "Easy ways to live well" hosted by Hugh Fearnley-Whittingstall and Steph McGovern, featured an interview with Breen, had Greaves as a special advisor, and used the UK Diabetes and Diet questionnaire developed by Thompson. Staff have also featured on CBBC's Operation Ouch, C4's How to Get Fit Fast, and Radio 4's 'Inside Science'.

**To maximise our international reach, we have capitalised on Massive Open Online Courses (MOOCs).** Goodyear, Griffiths, and Makopoulou designed and implemented two MOOCs in Physical Education and Youth Sport. Delivered with FutureLearn and the Football Association, these MOOCs have so far engaged 13,304 practitioners from 155 different countries, as well as 22 international practitioners and researchers who were involved in the leadership and delivery of course content. They also created opencpd.net to increase the accessibility of evidence-based continuing professional development in physical education and youth sport. Greig and Thompson are launching a new Healthy Ageing MOOC in April 2021 to translate knowledge of our healthy ageing research to an international audience targeting older adults, policy makers, clinicians, and other professionals.

#### 4.2 Wider engagement and contributions to the research base

We are dedicated to strengthening our academic partnerships from local to global levels. Staff have collaborators in 16 European countries. We are active in University strategic partnerships [REF5a 2.1.8] with collaborations in Australia, Brazil, India, Dubai, and North America. Our Institute for Global Innovation [REF5a 2.3.3] has, for example, funded an Empowering Coaching training programme for Brazilian coaches and athletes in Sao Paulo. We have also capitalised on strategic collaborative research networks within the UK (e.g., MRC-Versus Arthritis Centre for Musculoskeletal Ageing Research with University of Nottingham), as well as leading several of our own initiatives. Boardley was awarded €388,415 from ERASMUS+ to develop a collaborative partnership for a research-embedded strategic plan for anti-doping education in para-sport. Funding from Alzheimer's Research UK (£57K) to Aldred (Network Coordinator) has led to a Midlands Network Centre to support collaboration amongst dementia researchers from six Universities in the region (Aston, Birmingham, Warwick, Leicester, Loughborough, and Nottingham). Yeo, Jenkinson, Reynolds, and S. Lucas, with colleagues from the School of Psychology, were awarded a UK-Korea Partnering Award by the MRC and Korea Health Industry Development Institute (South Korea) for the project, "UK-Korea Consortium for Next Generation Brain Imaging and Simulation Technologies." Since REF2014, we have also hosted and collaborated with 24 international visitors in the School.

Our staff regularly review for journals both inside and outside of our Unit. Kavussanu has served as Editor of Sport, Exercise and Performance Psychology, 24 staff have served on international journal editorial boards, 22 as Associate Editor for 23 journals, and 8 have guest edited special issues over the REF2021 period, including:

- European Journal of Sport Science
- International Review of Sport and Exercise Psychology
- International Journal of Sports Physiology and Performance
- Journal of Orthopaedic & Sports Physical Therapy
- Public Health Nutrition
- Psychology of Sport and Exercise
- Qualitative Research in Sport, Exercise and Health
- Scandinavian Journal of Medicine and Science in Sports

Staff are also panel members and grant reviewers in the UK (e.g., Dunhill Medical Trust, NIHR, Leverhulme, and UKRI) and internationally (e.g., Academy of Finland Grant, Canada's Social Sciences and Humanities Research Council, German Pain Prize, NWO-FAPESP [Netherlands/Brazil], and Qatar National Research Fund).

#### 4.3 Awards and Honours

**Recognition of our wider influence and contributions** to the Unit and beyond comes from learned societies, scientific advisory committees, special interest groups and similar. Staff have been invited to give >75 keynote presentations, >10 have served on conference committees, >10 have sat on special interest groups, and at least three have held major roles. Cable and



Duda both served as President of the European College of Sport Science (ECSS), and Thompson is on this Executive Board as well as being a member of the Scientific Committee of the British Nutrition Foundation and Diabetes UK Community Education Insight Advisory Group. Greaves is the President Elect for the UK Society for Behavioural Medicine and has been invited to speak at the American Diabetes Association. Boardley is a founding member of the British Association of Sport and Exercise Sciences Clean Sport Interest Group, and a member of UK Anti-Doping's Innovation Commission. Falla is President of the International Society of Electrophysiology and Kinesiology, whereas Heneghan was awarded a fellowship to the Musculoskeletal Association of Chartered Physiotherapists and was West Midlands Hub Lead for the Council for Allied Health Professions in Research.

**Our staff, across all career stages, receive international awards and honours in recognition of their esteem.** Thompson won the 2015 ACSM Citation Award for her significant and important contributions to exercise science. Duda received an honorary doctoral degree from the University of Thessaly and was honoured with the NASPSPA Distinguished Scholar Award in 2019. She is also listed as a highly cited researcher with over 46,000 citations and is a Fellow of ECSS along with Cable and Thompson. Stewart was awarded a Distinguished Service Award from the Chartered Physiotherapy Society and was made an MBE in 2020 for services to physiotherapy. Goodyear won the International Association for Physical Education in Higher Education Young Scholar Award (2015) and the Qualitative Research in Sport and Exercise Early Career Scholar Award (2018). Other staff received recognition from journals regarding highly cited papers, with two as Reviewer of the Year and four for publishing articles amongst the most read (e.g., Cable, Stathi, Veldhuijzen van Zanten, Whitham, and Williams).

#### **Concluding remarks**

Building on our previously rated 4\* research environment, we have exceeded the ambitions set out in REF 2014 by growing critical mass in areas of excellence, capitalising on investments, and focusing on recruiting, developing, and supporting a diverse base of researchers to achieve excellence as recognized by our Athena SWAN Silver award. We have embedded a thematic approach to encourage more interdisciplinary research, new processes for improving grant preparation and capture, as well as embedding a whole school culture of impact. Along with the planned Institute for Health and Wellbeing and Graduate School of Sport, our research environment will continue to evolve and enable us to deliver transformational and paradigm-shifting world-class research.