Institution: Edge Hill University

Unit of Assessment: 24. Sport and Exercise Sciences, Leisure and Tourism

1. Unit context and structure, research and impact strategy

Unit context

With a strong emphasis on collaborative working and interdisciplinarity, Edge Hill University's (EHU) sport and physical activity research is focused on three areas: youth physical activity and health; sport-related mental health and wellbeing; and nutrition supplementation to enhance sports performance. Our award-winning community-based research has informed policy and practice in diverse settings including schools, charities, sports and other cultural organisations, with various beneficiaries including children, young people, sports professionals, and those with serious health conditions. This work addresses problems that are defined and co-developed in collaboration with longstanding research partners including Sport England, Rugby League Cares, Everton in the Community (EitC), as well as new partnerships including the West Lancashire Sport Partnership (WLSP) and Blackburn Rovers FC (see section 4). With the support of significant external funding, our research has had life-enhancing impacts on both physical and mental health for people locally, nationally, and internationally.

EHU first submitted to UOA26 in REF2014 and reflects the research of the Department of Sport and Physical Activity (SPA). We focused on two thematic areas, Sports Performance and Social Science of Sport. That submission included 14 staff (32% of Department's FTE) and 52 outputs. Research impact was a key strength, with 40% at 4* and 20% at 3*. We reported £74,415 in research income and one PhD award.

Our research strategy for this REF period has built on this inaugural submission to enhance sustainability and vitality, through focusing on staff development; quality research outputs; and partnership building. To do so, we:

1. Invested in staff to support researchers at all career stages to reach their potential and to facilitate the transition of all academic staff to become independent researchers. We have also ensured that there is researcher leadership through both appointments and promotions. We are submitting 83% of the Department's staff which is a 143% increase on REF2014. The staff without SRR are being supported to become independent researchers (see section 2).
2. Enhanced the quality of research outputs through the development of our research processes and environment, including peer review and support of research groups, to help make strong contributions to the knowledge base (see REF2). Our outputs have grown by 68% in the period.
3. Extended our collaborations and interdisciplinary approach both internally and externally with existing partners, and developed new external partners to co-create research projects and outputs, to ensure significant and continuing research impact. Partnership development is actively encouraged in research design phases and all researchers are encouraged to identify potential partners and collaborators from design stage. Our partnerships have grown as evidenced in section 4.
4. Built sustainable research capacity through a substantial increase in bids and resulting in external grant capture and income. We are seeing a steady increase in the number of bids made to a range of funders and our income has increased significantly by 773% (see section 3).
5. Extended our record of PhD awards significantly, and increased the number of externally funded PhD students: 22 PhDs were awarded and we recruited eight externally-funded PhD students (see section 2).

Unit structure

Our research is organised within the five research groups identified below. These reflect staff interests and expertise, as well as a strong commitment to undertaking applied and co-created

research with beneficiaries from a diverse range of organisations and settings. Staff and PGR students undertake research that corresponds to one primary research group, but the multi- and inter-disciplinary nature of our research means staff frequently work across multiple groups to generate research outputs and impact. On the census date, the Department is home to 41FTE academic staff at different career stages and the research groups include staff at all stages to ensure sustainability. They are supported by four FTE administrative staff and three FTE technician staff. The Department is also home to eight GTAs, four self-funding PhD students, and fifteen full-time Master's by Research (MRes) students.

The *Movement Behaviours, Health, and Wellbeing group (MBHWB)* is led by **Fairclough**, with support from **Midgley**, who mentor colleagues with developing research profiles (**Martin-Smith**, **MacDonald** (ECR), and **Tyler** (ECR)). The group's research aligns with the behavioural epidemiological framework to understand and promote movement behaviours. This focuses on physical activity and sedentary behaviours in relation to health and wellbeing. School-based physical-activity interventions, physical activity and sedentary behaviour measurement research using novel methodologies, and movement skill development, are also key strengths of the group.

The *Sport, Work, and Health (SWH) group* is led by **Smith** with **Haycock**, **Johnson** (ECR), **Lovett** (ECR), **Nelson**, **O'Gorman** and **Purdy** as members. The group undertakes sociological research on the relationship between sport, work, and health (particularly focusing on mental health) in professional and community contexts. This research has a particularly strong applied focus and incorporates a wide range of research users from those living in socio-economically deprived local communities, to professional athletes.

The *Sports Performance, Exercise, and Nutrition* (SPEN) group, led by **McNaughton** with support from **Sparks** and **Marchant** (readers), has members at different career stages: **Bridge**, **Marrin**, and **Carnegie** (HoD) are mid-career and **Cronin**, **Doncaster, Ellison**, **Kosteli**, **Langley**, and **Page** have developing profiles. This multi-disciplinary group's exercise physiology and biomechanics work researches the use of nutritional aids to enhance sports performance, lower limb function, pacing in endurance sports, and the growth and maturation in youth footballers. The group's psychology research explores the optimising of learning and performance in sport (e.g., attentional focus, visual information processing, motivation, feedback, competitive environments), the psychological benefits of sport and exercise participation (e.g., youth life skill development, and cognition), and the use of imagery in sport.

The *Politics, Pedagogy, and Practice* (PPP) group grew out of the Social Science of Sport Research strand identified in the REF2014 submission. Led by **Nelson** (reader) with support from **Maher**, the team includes staff with developing research profiles **Hughes**, **King**, **Lovett** (ECR), **O'Gorman**, **Partington** (ECR) **Purdy, Sugden** (ECR) plus two colleagues currently working on PhDs. The PPP group's research focuses on governance, management, and (micro) politics of sports organisations and educational institutions. It also examines the development and impact of sport and physical activity policy and programmes, alongside pedagogical practices and professional development in sport and physical education.

The *Sports Injuries* (SI) group's research focuses primarily on the prevention and management of injury by measuring aetiological markers within sport, health, and exercise contexts via the novel use of technology to quantify markers of injury and rehabilitation. The group, led by **Greig,** was formed in 2015 to provide strategic focus for developing collaborations between colleagues with emerging research profiles in biomechanics (**Langley**, **Marques** and **Page**) and sports therapy (**Brogden** and **Howe** (ECR)). A further four group members with sports therapy practitioner backgrounds are actively working towards becoming independent researchers as part of our strategy to encourage all staff to be research-active and qualified to PhD level.

Although staff are aligned to one primary research group, we encourage staff to work across multiple groups and with colleagues both inside, and outside the Department to enhance multi- and inter-disciplinarity. Collaborations among our own research groups include vision analysis and movement competence research from the SPEN and MBHW groups. We also collaborate with colleagues elsewhere across the University; including work with Computer Science (e.g., **Fairclough**; investigating machine learning in physical activity and wellbeing surveillance),

Psychology (e.g., **Midgley**; exercise rehabilitation through social identity theory in COPD patients, and **Ellison**; impact of sport concussion and wellbeing), Education (**Smith**, **Haycock** and **Lovett**; sport and child mental health), Health (**Langley**; Gait analysis of total hip replacement) and Nutrition Science (**Sparks**; nutrition and ultra-endurance exercise).

This flexible approach promotes novel ways of thinking which enables us to build a stable and sustainable base of research activity which is responsive to the changing needs of research users, including public-health commissioners; commercial organisations; charities, and practitioners. Thus, our research addresses the social, cultural, and economic challenges experienced locally, nationally and globally. Developing multi- and inter-disciplinary research teams in established and growing research areas also informs continuation and succession planning for future staff recruitment, and strategic decision-making for existing staff research development activities.

Our research ethos also places strong emphasis on impact and partnership building. As such, reciprocal modes of collaboration have been crucial for the co-production of knowledge, and for assisting the development of academic engagement with non-academic research users. Moreover, staff leading the impact agenda have previous experience of facilitating impact with external partners and this has driven a broader impact culture which has widened and developed research impact capability across our research discipline areas. For example, **Fairclough** developed and promoted impact staff-development training and disseminated the materials to colleagues to use as reference-guidance when planning new projects. Our three REF2021 impact case studies are indicative of such training and development, arising from established bodies of research and collaborative activities conducted with longstanding external partners Sport England, EitC, and Rugby League Cares and new partners in this period, West Lancashire Sport Partnership. The newly developed Sports Injuries research group was formed following the REF2014 impact case study in this area led by **Greig**. This line of 'pracademic' research has continued during the current REF cycle with Blackburn Rovers FC and provides the foundations for a future REF impact case study aligned to sports injuries in professional football.

Our research strategy and culture are compliant with the Concordat to Support Research Integrity. We are bound by the standards and processes of the University and our own particular professional bodies (such as BASES and CIMPSA). Most of the departmental projects are reviewed by the Science REC which is a multi-disciplinary committee chaired by **McNaughton**. Projects which require HRA ethical approval are reviewed by the University's Health REC (of which **Langley** and Ross are members) before being submitted to the HRA. Alongside departmental structures (see section 3), significant contributions to the University's research governance are made by **McNaughton** and **Midgley,** particularly in relation to laboratory protocols and operating procedures, and HTA research guidance, respectively. Staff understand that integrity is based on respecting all those who are involved in research to ensure their well-being and safety; and this has been particularly important as research re-emerges after COVID-19 restrictions.

Published outputs are made available in open-access format through the EHU Pure repository and, where possible, colleagues maximise the 'read-and-publish' agreements that the University has with specific publishers, including PLOS-One, Taylor and Francis. Gold open access has been particularly valuable to increase exposure and awareness of specific outputs and more generally, the research conducted by our groups. For example, in 2020 **Fairclough's** gold open access output in the field-leading *International Journal of Behavioural Nutrition and Physical Activity*, received the award for the journal's most cited observational study, this is in the top 5% of Altmetric's attention scores. We are also developing more rigorous approaches to open research through open data on open science and presentations on the open science framework. This is an area for development, but we are working to embed this within our research culture.

Future research strategy

Our sport, physical activity and health-related applied and community-based research is driven by questions that require co-developed collaborative work with partners who use our research to inform their practices and policies. This approach has been embraced as a central element of

our research culture and has been a key aspect of our ability to attract significant external grants (see section 3) which will sustain future work beyond REF2021. This work will be realised through the continuation and development of strong collaborative relationships with our community and industry partners, which will facilitate the development of new impact case studies, including those built upon our existing ones. We will review the multi- and inter-disciplinary expertise within existing research groups to evaluate the potential for creating research centres that generate novel research of demonstrable benefit to our research users and stakeholders in all areas. We will also continue to invest in our staff, and support staff to make their transition to research independence so that we can achieve our goal of 100% of current staff being independent researchers at the next REF census date. We will also continue to make appointments that align with our research strengths, whilst implementing policies and practices that will facilitate a diversification of our staffing base. We will continue to place emphasis on external funding from charities and affiliated bodies, but also orientate our goals to higher cost recovery sources. We will continue our interdisciplinary work with institutes and departments at EHU and beyond, and seek to further embed research excellence within our research culture, to improve the quality, as well as quantity, of outputs. We will also seek to double the number of PhD completions in the next period.

2. People

Overview

Since REF2014 we have been in a period of development with two key priorities: the establishment of research leadership, and the mentoring and support of early- and mid-career researchers to expand research capacity and strengthen our research culture and environment. We are fortunate to have colleagues with extensive practice-based expertise which enables the Department to align to end users; this has also helped to enable colleagues with practitioner backgrounds to become independent researchers. All staff have contributed to peer-reviewed outputs as authors, which is evidence of this commitment, and reinforces our research culture of supportive research staff development. Our people strategy is also compliant with the Concordat to Support the Career Development of Researchers and staff are actively encouraged to engage with all staff development opportunities, including external training and conference attendance.

Academic staff appointments have been made to senior, mid-career, and ECR positions, which have provided a strong mix of leadership and developmental potential. Since 2014 the leadership capacity of our research programmes has been strengthened through the recruitment (**Fairclough**) and promotion (**Greig:** August 2020) of two professors, and progression of four staff from senior lecturer to reader (**Marchant**, **Nelson**, and **Sparks** with **Maher** being promoted in August 2020). Professors and readers adopt research group leadership roles and consider the needs and development of their discipline areas within the context of the wider Department research strategy. Readers are supported in this role by line managers (all professors) who offer advice and guidance and share good practice. As a result, leadership is provided in each research group by experienced staff who guide and mentor peers. We develop lecturing staff to meet research goals – PGR student supervisory experience, assistance with grant applications, methods development, etc. – that align with progression criteria, so staff are able to advance within and between grades. ECRs are integrated into research teams; for example, **Johnson** is part of the team researching community sport and mental health, and **Tyler** is part of the team researching children's 24-hour movement behaviours. As such ECRs benefit from the wider research environment and have access both to informal support and formal guidance by managers and/or mentors to map out their medium-term research plans, so that development needs can be identified and met.

Strategic deployment of existing staff within research groups has improved research expectations and capabilities. For instance, during the REF2021 cycle, **Greig** moved from the Sports Performance, Exercise, and Nutrition group to lead the Sports Injuries group, an innovation in the period. **Greig** has provided substantial leadership and mentoring for the staff in this group who, reflecting the practitioner and clinical nature of sports therapy degrees, includes disproportionately fewer independent researchers than in other groups. This leadership intervention has increased research collaboration among Sports Injuries colleagues, all of whom are now research active, if not yet independent, with developing publication records. This has

been achieved through collaborative research projects with all staff having defined and supported roles during the project followed by a systematic process of manuscript construction and supportive review before submission. In the next REF cycle, they will continue to be supported to complete their transition to research independence. An interdisciplinary project led by the group explores health of dance performers (with colleagues in Nutrition and Performing Arts).

Equality and diversity

In this submission, 83% of SPA's academic staff are identified as having SRR, up from 30% in REF2014, demonstrating the success of our investment in staff over the period. Our REF2021 submission shows a significant improvement in female representation, with eight (24%) female and twenty-six (76%) male members of staff included, all based in SPA except for one male colleague. This compares with two females (14%) and twelve males (86%) in REF2014. In terms of outputs being submitted, articles attributed to female colleagues are under-represented, which is potentially explained by a larger proportion of female colleagues being ECRs (38% of women, 15% of men). To address this, we will support women to take on lead authorship roles as they move out of ECR status.

We recognised that we still have work to do on both diversity and gender representation within the Department. Our SPA Athena Swan Bronze application (outcome pending April 2021) acknowledges the need for further improved female representation, particularly in senior positions, and the actions include developing supportive strategies for female staff to achieve promotion (e.g., to reader, professor). In response we have introduced mentoring from experienced female researchers external to the Department, to avoid overburdening our small number of female colleagues, and encourage participation in leadership training (e.g., Advance HE's Aurora). In the next REF period, we will also focus on female representation amongst our PGR student community to create a 'pipeline' of future female researchers by reflecting on how we promote our recruitment opportunities so that we reach under-represented groups. With respect to gender, we will promote women's success in sport through organising a 'Women in Sport' Conference: we hope this will also attract potential applicants, both for academic posts and PhDs, who will then have greater knowledge and understanding of sport at Edge Hill. We will also ensure that 50% of speakers in our seminar series are women as we appreciate that this not only gives women a greater voice, but provides role models for students who will be the next generation of researchers.

The lack of ethnic diversity in the Department broadly reflects the sector and therefore our approach must be to engage with sector-wide initiatives. Nevertheless, we are committed to addressing this through encouraging the appointment of BAME visiting professors and researchers. We will also look to make the GTA scheme more attractive to BAME PhD students by engaging with undergraduate and master's degree providers who have more diverse profiles to promote our opportunities. It will be crucial that our recruitment processes, particularly where we advertise opportunities (networks and disciplinary associations etc) and language used in job descriptions, encourages researchers who are underrepresented to consider our opportunities. We will also adopt additional measures to support part-time doctoral study, and ensuring maximum diversity in supervisory teams, where practical and possible. In addition, we will continue to actively encourage applicants from all backgrounds to apply to all research roles at all levels whilst actively promoting the nature of our research.

The University is also a mindful employer, committed to supporting mental health and wellbeing and a Disability Confident employer committed to recruiting, supporting, developing and retaining disabled staff. Options such as flexible working patterns and remote working are available to all staff, which can be of particular benefit to those with caring responsibilities, disabilities and health conditions. For example, where COVID restrictions have made it necessary, staff in this unit have been supported to work remotely, restructure their working patterns, access counselling services, have regular 'keep-in-touch' meetings with their line managers, and those with parental responsibilities have had the opportunity to take periods of special leave. To support wellbeing, all staff are encouraged to take annual leave throughout the academic year, rather than as one large block during the summer.

With regard to returning to research from long-term absence, managers are cognisant of the significant shift in focus back into the work environment after long-term absence and treat each staff member's circumstances sensitively. Establishing agreed objectives is a valuable motivational aid to support returners back into the routine of research activity but such objectives are flexible, adaptable, and are driven by the staff member's progress as they re-immerse themselves in the job role and managed via PDRs. Colleagues returning to research after maternity leave discuss their aims and aspirations with line managers while on maternity leave as part of their allocated 'keeping in touch' days, where desired, which can be used for research-related activity. This activity is specific to each individual and in the recent past has included manuscript writing, data analysis, research-related meetings with colleagues and developing a new programme of research with external partners. We encourage staff returning from long-term leave to access the priority stream in RIF; those who had RIF and other internal awards before their absence, automatically have those grants extended to cover the period of leave. Two members of staff included in the submission are returners from long-term absence.

Staff development

Staff training and development are provided via the University's Researcher Development Programme, through the institutes and, in a more bespoke manner, by the Department. Academic staff undertake a research needs analysis with line managers and are supported by research mentors. Staff are regularly directed to in-house research training activities that are focused on specific research skills (e.g., project management, grant writing), methods (e.g., conducting interviews, constructing questionnaires), and software applications (e.g., GraphPad, SPSS, NVivo). We also place strong emphasis on improving staff awareness of research quality indicators through research group activities such as journal clubs, dedicated research and impact planning meetings, and informal peer review via colleagues who are editors or on editorial boards. This gives staff confidence to identify the most appropriate journals for their research, taking into account the audience, reach, international significance, and novelty of the research. This includes broadly influential journals with high rejection rates, as well as specialist outlets relevant to particular disciplines.

With a specific strategic focus on increasing external research grant funding, all staff with SRR were required to build grant funding into research planning during the period. 5-year research plans, with goals that relate to grant capture, are discussed bi-annually through the personal performance development and review (PDR) process. To enable the ongoing success of this strategy beyond 2021, we will work to improve staff confidence, expertise, and understanding of the application process to increase the pool of colleagues making applications.

Staff can apply for staff development funding to take external courses (e.g., staff enrolment on courses for multilevel modelling, compositional data analysis, and ultrasound diagnostics) where there is no internal provision. These plans are anticipated and planned for in PDR meetings where staff identify their development needs and discuss potential opportunities for training and/or staff development funding applications. Less experienced colleagues receive mentoring from more established researchers who provide guidance and support with specific developmental needs. For instance, **Fairclough** trained **Tyler** as a new member of staff and ECR to undertake raw accelerometer data processing, then following PDR discussions **Tyler** enrolled in an online Compositional Data Analysis training course; in turn, he will mentor others using such methods including PGRs. Although we have no sabbatical system, staff can also apply for University research support funds for periods of teaching relief to advance research activities. **McNaughton** received such funds to be visiting scholar at the University of Sao Paulo which has resulted in nine articles and the collaboration is on-going.

All staff contribute to the broader research environment in addition to their discipline-specific activities. Our research seminar series provides a forum for SPA staff and PGR students to share their work and gain valuable presentation experience. External speakers delivering presentations have also been important for stimulating staff discussion and interest in new research areas: the Department has been significantly enhanced by visits and presentations from external speakers who are international field-leaders including Professor David Lubans (University of Newcastle, Australia), Professor Greg Welk (Iowa State University, USA),

Professor Gareth Stratton (Swansea University), Professor Dominic Micklewright (University of Essex), and Professor Alan St Clair Gibson (University of Hull). Since these presentations **Fairclough** for example has collaborated with Welk (Youth Activity Profile YST funded project), Lubans (co-editors of Routledge Handbook of Youth Physical Activity), and Stratton (MRC and UKRPR grant applications). Our commitment to having 50% women presenters in the future will help to broaden the potential for new collaborations.

The Department also works closely with the University's research institutes, particularly the Health Research Institute (HRI) and Institute for Social Responsibility (ISR). This facilitates interdisciplinary working, but also offers opportunities for senior staff to act in a mentoring role, and for ECRs/MCRs to access further sources of training and development. **Fairclough** is a member of HRI Management Group (**MacDonald** as the alternate) and leads the Public Health research theme and contributes to HRI staff development activities. This included leading a successful RITA funding application with colleagues from the Department of Computer Science and Faculty of Health, Social Care, and Medicine. Several Department staff are members of the ISR (**Haycock, King, O'Gorman, Smith**), have contributed to roundtables (**Haycock, Smith**), led Institute-supported events at the University's Festival of Ideas (**Haycock, Johnson, Smith**), and submitted external funding applications to organisations including the Wellcome Trust with support of the ISR grant writing series (**Smith**). **Smith** also served on the Internal Advisory Board.

Our culture also views *all* students as nascent researchers and so we strive to engage them in the research process to both enrich their individual experience and to ensure a pipeline of researchers across the range of disciplines common to our research. Research seminars are therefore open to all students and where appropriate, undergraduate students are encouraged to integrate their dissertation projects within PGR student and staff research programmes. In the next REF period, we will introduce an internship scheme for UGs to participate formally in the Unit's research activities, while two of our current RAs were former MSc students who engaged in research-related work with our partners EitC, while completing their studies.

ECRs and those transitioning to research independence

The research aspirations and development needs of ECRs are discussed through the probation and/or PDR processes. Line managers agree an appropriate balance of research and teaching goals to guide ECRs' workloads while enabling development of research, organisational, and leadership capabilities. This can involve activities such as engaging with external collaborators and partners, giving research seminar and conference presentations, planning internal and ECR external grant applications, leading research group activities, co-authoring research outputs, and gaining PGR student supervisory experience. ECRs are mentored by more experienced researchers within their disciplines and are encouraged to seek out multi-disciplinary research opportunities through engagement with the University's three research institutes. This has led to a number of successful outcomes and specific career enhancing developments for individual ECRs; specifically successful grant applications, The Waterloo Foundation grant (**Tyler**), and NIHR Clinical Research Network North West Coast (**Langley**) and staff taking up their first PGR supervisory roles (**Brogden, Ellison, MacDonald**), Moreover, the research group structure provides a supportive environment for ECRs to build confidence working collegially and with more experienced colleagues on peer-reviewed outputs, for example **Johnson**'s work with **Marchant** and other colleagues; and gain experience of leading research grant bids, for example **MacDonald** (through applications for internal funds).

Formal research training is also available to staff who have entered academia from practitioner backgrounds. Such staff can undertake PhD study with support from the Department. In the REF2021 cycle, staff have also been supported with the cost of PhD fees and enhanced staff development allocation, equivalent to research time allocation for independent researchers, to help them progress their studies. Staff without PhDs who have a series of linked publications can apply for a PhD by published work under the guidance of an internal mentor: one member of staff completed his PhD by publication during the REF period. Six practitioner colleagues are being supported to become independent researchers: three are pursuing PhD by publication and three are studying for PhDs with other HEIs. Support is tailored to the needs to each individual

and includes collaborative project working, research skills and methods development, allocated research time, group writing, and mentorship from more senior colleagues. As a result of our recruitment policy and staff development support, 85% of staff have PhDs. This approach is consistent with our strategic intention for all current staff to be independent researchers by the next REF census date.

Postgraduate research students and supervisory capacity

Our PGR student community has grown significantly since 2014 (one award) and this has resulted in a notable increase in awards, with 19 PhD students completing their studies (no professional doctorates). Our PhD student training and support is coordinated by **Greig** and is central to our excellent record of timely completions. Tools such as the Vitae Researcher Development Framework (RDF) are available to monitor and record PGR students' research skills, experiences, and competencies. Use of the RDF is a requirement for PGR students within their project registration process and informs ongoing student-supervisory team discussion through the duration of the programme of study. At the census date, there are 12 PhD and 15 MRes students who are distributed among the research groups, with a further seven PhD and seven MRes students starting their studies in January 2021. Of the seven PhD students registering in 2021, three previously completed the MRes, one an MSc, and another completed BSc studies at EHU, highlighting a pull-through of PGR students from undergraduate and masters to PhD level study.

Most PGR students produce peer-reviewed outputs during their period of registration. This is a deliberate strategy employed to enhance professional development of the students and improving their employability. The benefits of this approach are evidenced by the fact that, within the REF2021 cycle, upon completion of their doctorates 100% of our PGR students went on to post-doctoral research positions, lectureships, or research-related posts in industry; including postdoctoral research fellowships at University of Limerick (Taylor) and Leeds Beckett University (Sanders); and lecturers in Child and Adolescent Mental Health (EHU: Owen); Sport and Exercise Science (Birmingham City University: Gough); in Sport and Health (Staffordshire University: Duffell), and Sport, Physical Activity Health (EHU: Johnson).

This increase in PhD registrations and completions has undoubtedly been enabled by the University's highly effective GTA scheme. To complement this, our strong partnerships, both established and new, have helped staff to secure external funding for PhD studentships from a range of partners (see section 3). Around one-third of the PGR students in the Department have been supported by external funds. This increase in the number of PGR students and awards reflects the strategy of recruiting staff with research experience and expertise and facilitating their development during the REF2021 cycle. The volume of PGR students studying in the Department since REF2014 has allowed more staff to take on research student supervisory roles. Furthermore, staff also supervise PGR students in the Faculty of Health, Social Care, and Medicine, and Faculty of Education, and at other universities in the UK and overseas. This collective growth in the number of staff supervising PGR students has expanded the breadth of methodological and discipline expertise needed to support the growing diversity of multi- and inter-disciplinary PhD research projects undertaken in the Department.

REF Management

REF2021 preparations were a collective effort from all staff in the Department. The process involved each staff member using the REF criteria to complete self-ratings of their outputs, which were then independently reviewed by two staff with knowledge of the research discipline area. Wherever possible we aimed to pair up a more senior researcher (typically professors, readers, and senior lecturers) with a less experienced colleague (including ECRs), so development and support were embedded into the process. The peer-review comments were shared with submitting staff and included suggestions to enhance and develop their research. These steps led to each output being given an indicative rating. This process was introduced early in the REF2021 cycle and fed into a 'mock REF' exercise in 2017. Feedback on general areas for development of outputs noted through the mock REF were communicated to staff (immediately after the exercise and revisited, where appropriate, in performance development review meetings) to encourage them to act on this and aim to produce their best possible work in the

remaining years of the REF cycle. Once staff with SRR were identified, a longlist of outputs was considered by the professors and readers group which resulted in the preliminary outputs selection. All stages of the process were supported by the Department Administration team who managed communications for the self-rating and peer-review phases and ensured the timely uploading of ratings and comments to the Pure REF management system. At all stages, information was shared to ensure transparency and staff were reminded that the number of outputs included in the REF would have no bearing on career progression or promotion, or, indeed, access to any research support resources.

Beyond REF2021

We are committed to growing our research community at all levels in the post-REF2021 period. Academic staff appointments will be aligned to our research aspirations, but emphasis also placed on continuing to diversify our staffing base. Further, in the coming years we aim to grow our PGR community through increased marketing of MRes opportunities to our undergraduate students. In addition, we will continue to propose novel PhD projects to attract high quality applicants through the University GTA scheme which will complement a planned increase in collaborative funding applications to support externally funded PhD studentships and research assistant positions. We are also exploring new M-level taught provision with an applied research focus which can provide enhanced progression opportunities from our undergraduates.

3. Income, infrastructure and facilities

Research income

Our funding successes during the period have arisen from the development of strong collaborative partnerships with external organisations cultivated by staff during both this, and the previous, REF period (see below). This strategy has had significant success. External research income for REF 2014 was £74,415; for REF2021 we are reporting external grant income of £649,781 from 53 external funding applications representing a 773% improvement. Reflecting partnership working, 42% of applications in this period were successful. This significant growth in research income is a consequence of our commitment to this key research strategy objective.

Our strategic efforts to develop strong applied research collaborations and generate income have resulted in funding from internationally recognised organisations. Alongside our very fruitful, long-standing partnerships with EitC, RFL and Sport England, we have established relationships with industry (Les Mills International, Asta Real); local authorities (Lancashire County Council, Sefton Borough Council); charities (Rugby League Cares, West Lancashire Sport Partnership, Youth Sport Trust); professional bodies (the Premier League, the English Football Association, Sports Coach UK, Everton Football Club). Collectively, these funding awards have helped to grow the national and international profile and reputation of our award-winning, impact-focused, research. Some have also funded PhD projects (Asta Real, Sport England, Sefton Council and WLSP). In turn, this has helped to win additional grants from national funding bodies (Research England, Sport England, Big Lottery, The Waterloo Foundation). Our external research funding sources thus reflect the diverse nature of the SPA research groups. Moreover, this increased level of external grant applications and awards is consistent with the upward trajectories of outputs from those research groups, with the majority of the funding applications and successful awards having been in the areas of physical activity, sport, and mental health with additional contributions in sports performance nutrition, and coaching.

The University's RIF awards are an additional resource that have supported SPA research since REF2014, particularly with respect to supporting projects that have resulted in securing external funds. In the current period Department staff made 28 successful RIF applications (six from ECRs) to support project work (total awarded £184,063) and 43 applications (nine from ECRs) to support conference attendance (total awarded £27,766). This funding has been used strategically to achieve our research aims by pump priming further research, developing external grant applications, and employing research staff to build our research capacity. Examples include **Fairclough**'s RIF-funded Youth Activity Profile project. This was key to securing external funding to extend the work from the Youth Sport Trust, which also involved international

collaborations with Iowa State University, and resulted in research outputs. Additionally, RIF funding awarded to **Langley** in partnership with Wrightington, Wigan, and Leigh (WWL) NHS Foundation Trust laid the groundwork for subsequent external funding from Symbios Orthopédie S.A., while the research resulting from **Sparks**' RIF award contributed to the evidence base underpinning the research funded by Asta Real.

As a relatively young Department in research terms, bid development is in a capacity-building phase which has largely been led by the professoriate. We will support less experienced staff to make external bids by following our existing, successful, strategy of partnership building with research-users who also fund research noted above. We will also, however, encourage staff to make bids to research councils and identify suitable programmes and funder priorities for their research interests and career stage. These plans will be identified early and ECRs and MCRs will work with experienced mentors, both internally to the Department and externally where required, to develop strong, competitive bids. We will also encourage them to seek collaborations to work with experienced PIs on larger projects.

Our revised bidding strategy has a number of strands as we have moved beyond dependence on internal funds for our research projects. The RIF investment has begun to show outcomes as discussed and a culture of bidding is beginning to emerge. For ECRs and those immediately post-ECR, we encourage them to plan for external bidding by targeting smaller funds, such as the British Academy, and then gradually to look to other funders such as Nuffield, NIHR and ESRC – focusing particularly on thematic priorities within health and wellbeing. We recognised that these funds are extremely competitive, so we also encourage colleagues to work with more experienced staff both in EHU and beyond. To do this, networking is crucial so that partners can recognise that our researchers can fill gaps in expertise. In addition, we will work with younger colleagues to identify funding programmes specifically aimed at ECRs. More senior colleagues will continue to target more substantial amounts of funding from research councils, major charities, and organisations, including NIHR, to significantly impact on our research capacity and capability. This is resulting in a higher volume of bids; this includes, in the census period, submissions to MRC, ESRC, and Wellcome Trust. While these have yet to be successful, they are indicative of our goal to increase the balance of awards with higher overheads.

Given our track record in developing partnerships by identifying charities and other organisations that require our expertise to address their challenges, we are able to support less experienced colleagues to engage with this approach. **Langley's** work with WWL is an example of an ECR targeting appropriate partners, both internal (through the Health Research Institute and with University funding) and key external, that enhance research and help secure external funding. Our existing work with schools means we are well-positioned to engage with the post-COVID wellbeing agenda that is emerging which focuses on a holistic approach to children's development. Our work also speaks to the current government's 'levelling up' agenda through its work on holistic health and wellbeing, particularly in disadvantaged communities.

Research infrastructure

In 2015 the Department research infrastructure was more formally embedded through the establishment of a Research Committee, with a cross-section of research-active staff representing the five research groups, including professors, readers, lecturers, and PhD students. It provides a forum for research-related matters to be formally discussed and recorded, and subsequently disseminated to the wider staff body via the research group representatives on the Committee.

The Department Research Ethics Committee (DREC), which gave ethical approval to staff and PGR student projects, also provided important support via proposal review. In mid-2020 the DREC was replaced by institutional subject-level research ethics committees (see REF5a). Seven Department staff contribute to these committees as chairs and members and thus still gain the development benefits afforded by DREC membership.

Staff also benefit from activities organised by the three research institutes, such as interdisciplinary research seminars and developmental activities to support grant development and writing for publication. Interdisciplinary working is also promoted through internal competitive

grant calls, with each Institute having its own funding stream. **Fairclough** and **Langley** have successfully obtained such funds to enable collaborative projects with external partners involving colleagues in the Department of Computer Science and the Faculty of Health, Social Care, and Medicine, respectively.

Technical Support

A team of three technical staff support research through ensuring research activities are Human Tissue Act (HTA) compliant, managing equipment procurement, maintenance, and service, and assistance during data collection. Where the roles of technical staff overlap with their own academic aspirations and career development plans, the Department has supported enrolment in PGR programmes with supervision from the academic staff team (e.g., technician Mosher completed his MRes in the area of dietary nitrate and cycling time trial performance, which resulted in published outputs); this demonstrates our inclusive approach in recognising the potential for research at all levels.

Research facilities

We have invested in our physical environment and equipment which enable excellent research to be conducted and maximise the potential of our high-quality specialist accommodation. We have dedicated laboratories and clinical spaces for sport and exercise psychology, exercise physiology, biomechanics, biochemistry, strength and conditioning, (p)rehabilitation, performance analysis, and physical activity assessment. Since 2014 the University has invested circa £70 million in sports and exercise facilities on the campus. This has enhanced the opportunities for our applied research work with professional sports performers including Wigan Athletic FC, Blackburn Rovers FC, and elite endurance athletes, as well as clinical partners, Wigan, Wrightington and Leigh NHS Trust and Aintree University Hospital. Moreover, our facilities have assisted research engagement in our community sport and mental health work with EitC, Merseyside Sports Foundation and State of Mind Sport, alongside youth physical activity studies, for example schools peer-mentor training.

Technical equipment is also used to generate cutting edge research data. We have over 200 accelerometers (ActiGraph, GENEactiv, Axivity, Sensewear Armband) that enable innovative research into 24-hour movement behaviours, as well as the development of novel accelerometer metrics to define physical activity levels for health. Resulting data is processed through a bank of high specification PCs and laptops. These devices have enabled high-frequency assessment of movement behaviours in children (e.g., AS:Sk Project), adolescents (GPACT Project) and older adults (Sport England Get Healthy Get Active Project) resulting in several publications. Moreover, this track record of publications has underpinned two MRC Research Methodology Programme grant applications in the current REF cycle. These applications achieved competitive scores but ultimately were not funded; however, the return on investment of these devices has been high in terms of data generated, outputs produced, and staff development activity.

The Sports Injuries group make frequent use of accelerometry-enabled GPS units and the isokinetic dynamometer which is the gold standard for clinical assessment of strength. The focus on objective markers of injury aetiology has supported MRes and PhD projects, numerous outputs, and applied work with professional sports teams (Wigan Athletic FC and Blackburn Rovers FC). This work has included clinical case study research; e.g. post-operative anterior cruciate ligament rehabilitation. These facilities have allowed practice-oriented staff to gain valuable research experience to support their developing profiles.

The environmental chamber allows the manipulation of both temperature and altitude simulated hypoxia and has been used for a range of research projects and athlete acclimation for events such as the Marathon des Sables. It has also been used to investigate the use of buffering agents at high altitude and ongoing work is investigating whether these substances are effective in hot and humid, as well as cold, environments. Many of our physiology and nutrition projects have also used the clinical chemistry analyser and microplate reader which is used for enzyme-linked immunosorbent assays. Our two blood gas analysers have been extensively used in our distinctive work on exogenous buffering agents and exercise performance. This medical-grade equipment enables our mechanistic work to elucidate exactly how these buffering agents work to

help improve performance. For this reason, the design of all of our experimental protocols is heavily dependent on the use of this equipment.

Our use of the Tobii Glasses 2™ mobile eye tracking system and Sports Vision Trainer™ has also allowed a number of projects exploring visual behaviour in skilled and endurance sport settings. Simulation and EPrime software have enabled exploration of various cognitive functions in relation to acute exercise, while a specialist iMac lab enables our performance analysis research.

Beyond REF2021

The research funding awarded has enabled a substantial growth in research capacity that has been reflected in increased research outputs, enhanced reach and awareness of our research among research beneficiaries and stakeholders, growth of the PGR student community, and better data collection capabilities through equipment purchases. We plan to build on these funding successes in the future by increasing the number of academic staff consistently making grant applications each year. We will mentor ECRs and less experienced colleagues in this process; for example, working with them on RIF awards or early-career funding streams as a precursor to seeking external funds. More experienced staff will apply for more significant external awards targeting research councils, major charities, and NIHR. Such applications will complement grant proposals to existing and future targeted research partners. We will use these financial resources to support activities (e.g., data collection, dissemination, public engagement) and expand our capacity to undertake research, particularly via PhD studentships and postdoctoral positions. Where we identify a need to purchase equipment to further specific research areas, we will make business cases to the University within our annual Department review and plan. We recognise that we have excellent technical spaces and equipment for research, and will strive to maximise these with community groups and sports organisations at all levels as we emerge from Covid-19 restrictions beyond 2021.

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

Collaborations

During the REF2021 cycle our commitment to collaborative working in each group has contributed to achieving key objectives within our research strategy. Specifically, partnership collaborations have been reflected in our success relative to: (1) increasing the volume and quality of research outputs: (2) development, identification, and collation of the research impact evidence included in our submission; (3) applications for external grant income: and (4) PhD student recruitment and timely completions. We therefore consider collaborative working as central to our core research activity and continue to invest time and energy into maintaining existing partnerships as well as seeking and developing new ones.

Alongside the collaborators and partners who have funded our research and helped to define our research agenda (identified in section 3), we work with many others, both UK and international, including: HEIs, Liverpool John Moores, Coventry, Sao Paulo (Brazil), University of South Australia, and Iowa State; industry, including Nutriprot GmbH; health bodies, including, Liverpool Heart and Chest Hospital and CHAMPS Public Health Collaborative; community and voluntary sector; local authorities, including West Lancashire Borough Council, Liverpool City Council, and Sefton Council; sports clubs, including Blackburn Rovers FC, Everton FC, and Warrington Wolves RLFC; national governing bodies including, The Football Association, and the British Canoeing Union; and charities including, State of Mind Sport, and Youth Sport Trust.

Identification and development of innovative and new routes to impact are actively discussed by research groups and embedded strategically into the design of current and planned projects. For instance, our physical activity, health, and wellbeing work in West Lancashire schools includes regular teacher workshops to discuss the research findings and how curricula and teaching delivery can be informed and modified to enhance children's health literacy and health-related behaviours. These impact-related discussions shape the agenda of meetings with external partners to gain their input into the most effective ways of translating our research to enhance its benefit for end-users and stakeholders. We have co-produced projects including Active Schools: Skelmersdale (WLSP), Tackling the Blues (EitC), and Offload (Rugby League Cares). This has

also provided opportunities for knowledge exchange and impact-focused dissemination, specifically workshops with school stakeholders, community sports workers, senior leaders of sports charities, professional sports organisations and arts and cultural organisations. Most recently, the benefits of this work in generating knowledge exchange activity was reflected in our being awarded of £527,000 by Research England and the Office for Students to extend our work with EitC on Tackling the Blues with new partners, including Tate Liverpool.

Where established partnerships with collaborators are in place, other staff are brought into projects to ensure strong co-development, to enable staff development, and to facilitate mentoring of ECRs. Moreover, this serves to foster the sharing of new and innovative ideas to further the potential of the collaborations. For instance, the introduction of ECR **Tyler** to our collaboration with WLSP led to a novel dynamic motor competence assessment tool, The Dragon Challenge, being adopted in local schools to facilitate assessment for learning within physical education. The collaboration between **Greig** and medical staff at Blackburn Rovers FC has led to novel objective measures during player profiling and rehabilitation, which has produced research outputs and opportunities for PGR research. The inclusion of **Haycock, Johnson** (ECR), and **Lovett** (ECR), alongside colleagues who are pursuing doctoral study (e.g., Greenough), in our partnership work with EitC has led to the expansion of new research programmes on mental health in families, military veterans and physically inactive men, as well as mental health support for sports coaches and other delivery staff. Such partnerships exist across each of the research groups and enable colleagues to share their expertise and inform programmes, initiatives, and policies enacted within the collaborators' organisations. The applied nature of our research work with these partners is a strong and distinguishable feature of our submission.

Contributions to the research base

Staff undertake significant research service activity in their fields, e.g. research related roles including editorial responsibilities, which are identified through the PDR process, and are supported through dedicated time and resources. **Fairclough** is Associate Editor for the *Journal of Sports Sciences* (Physical Activity, Exercise, and Health section), and is on the Editorial Board of the *International Journal of Environmental Research and Public Health* (Health Behaviour, Chronic Disease and Health Promotion section). He also makes a direct contribution to the REF2021 assessment as a Unit 24 sub-panel member. **Smith** is Managing Editor of *Leisure Studies*, former founding and co-editor of the *International Journal of Sport Policy and Politics*, is on the editorial boards of *European Physical Education Review, International Journal of Sport Policy and Politics, Qualitative Research in Sport, Exercise and Health*, and Guest Editor of *Frontiers in Sociology*, *Sociology of Sport Journal*, and *European Physical Education Review*. **Nelson** is an Associate Editor for the *Sport Coaching Review* journal and is on the Editorial Board of the *International Sports Coaching Journal*. **McNaughton** is Co-Editor in Chief of *Research in Sports Medicine*, and formerly an Associate Editor for *Journal of Science and Medicine in Sports, Journal of Sports Medicine and Physical Fitness*, and *Journal of the International Society of Sports Nutrition*. **Marchant** is section editor (Sport and Performance Psychology and Motor Learning) for the *Journal of Sports Science and Medicine*, and formerly Associate Editor of *Movement Science and Sport Psychology*. **Greig** is an editorial board member for *Isokinetics and Exercise Science*, has been approached by The Society of Sports Therapists to develop a Sports Therapy-specific journal, and has also been invited to sit on the British Association of Sport and Exercise Medicine's Scientific Advisory Group. We are also represented on the editorial boards of *Sports Coaching Review* (**Purdy**), *Soccer and Society, and Managing Sport and Leisure* (**O'Gorman**), *Journal of Science and Cycling, Frontiers in Nutrition* (**Sparks**), and *Quest* (**Maher**).

Furthermore, staff support external grant review processes by providing expert peer-reviews of applications to esteemed UK and international funders. Among others these include MRC, ESRC, NIHR, British Academy, Academy of Finland, Hong Kong Research Grants Council, and Exercise and Sports Science Australia **(Fairclough, McNaughton, Smith, Maher, Nelson, Midgley)**. Moreover, all academic staff service and contribute to the research base by serving as peer-reviewers for journals.

Invited and keynote conference presentations have been given by staff at events such as the Youth Sport Trust Conference, International Sport Business Congress, British Association of Sport and Exercise Sciences Conference, and International Sports Sciences Congress (**Fairclough**), government committees (Health Select Committee: **Smith**) and policy-oriented events (Westminster Media Forum: **Smith**), non-departmental government bodies (Sport England, **Smith**) as well as practitioner-researcher interface events (e.g., Catapult Forum, Society of Sports Therapists Annual Forum: **Greig**; Society of Sports Therapists, Football Medicine Performance Association, Healthy Stadia, Mind, Street Games: **Smith**; EitC Annual Health and Wellbeing Conferences: **Smith, Haycock, Lovett**), and public engagement activities (e.g., British Psychological Society endurance psychology: **Marchant**; European Congress of Sports Science and Division of Sport and Exercise Psychology: **Smith**). Staff have also been part of conference scientific organising committees (e.g., British Psychological Society Sport and Exercise Psychology conference: **Marchant**; European Sports Development Network: **Smith, Haycock** and **Lovett**). In the emerging discipline of sports therapy, **Greig** presented a session on "Facilitating a research culture and platform in sports therapy" at the last annual forum (2019) which is helping to shape the discipline.

Additionally, staff have written or edited textbooks to inform and synthesise the research landscape in various fields. These have included the *Routledge Handbooks of Youth Physical Activity* (**Fairclough**) and of *Youth Sport* (**Smith**), as well as books in the areas of sports coaching (**Nelson**), sport governance (**King**), and teaching physical education in special educational needs contexts (**Maher**).

Contributions to economy and society

Smith's and **Haycock's** research contributed to the UK Health Select Committee's work on suicide prevention and All Parliamentary Group on Sport and underpinned the development of our school-based sport, education and mental health programme, Tackling the Blues (TtB). In late 2016, TtB received the Outstanding Contribution to the Local Community award at the Times Higher Education Awards, the 2017 Cross-Sector Award by the Charity Times, and the Silver medal at the 2020 National Sports Business Awards for fan engagement. This important applied work is detailed in the accompanying impact case study and which led to the award in 2020 of £527,000 by Research England and the Office for Students to expand the programme for a further two years. This has enabled the further development of partnership working with the Faculty of Education and creation of a new collaboration with Tate Liverpool to incorporate an art for mental health strand into the programme. This will enable more staff at various stages of their research careers (e.g., **Lovett**, Greenough) and new research assistants to benefit from the expanded programme of research and knowledge exchange, and contribute to the production of research outputs and new impact activity in the next REF cycle.

Through their work with the national mental health charity 'Chasing the Stigma', **Smith** and **Haycock's** research informed: (i) the development of the mental health and wellbeing strand of the English Premier League's Life skills and Personal Development programme; (ii) the provision of mental health training to 4,000 people from over 20 diverse organisations; (iii) and the creation of its free-to-access 'Hub of Hope' app which has enabled over 120,000 unique users to search for local mental health services and which is now used by NHS England, Mind, Rethink Mental Illness, MHFA England, Public Health England and the Samaritans to signpost the public to local mental health services. **Smith** was also invited to contribute to the 2017 independent Duty of Care in Sport Review for government, and his work with **Haycock** has underpinned the delivery of mental health work with Rugby League Cares and several rugby league clubs, as well as ongoing work with DOCIA Sport and national sports organisations including UK Coaching which includes other colleagues with emerging research profiles (e.g. Greenough) who will therefore be eligible for inclusion in the next REF.

Fairclough is a core member of the UK Chief Medical Officers' Physical Activity Surveillance Expert Committee and was an Expert Working Group member for the UK Chief Medical Officers' Physical Activity Guidelines for Children and Young People Review (2018-2019). Prior to this he was a member of the Department of Health Expert Group for the Children and Young People's

Physical Activity Guidelines Infographic and is currently an expert contributor for the Covid-19 UK Physical Activity and Exercise Expert Rapid Review Service.

Finally, to ensure broader impact and awareness of our activity and contribution, staff also contribute to grey literature, including media outlets (e.g., BBC, Sky Sports, national and international newspapers and radio), policy reports and select committee meetings (e.g., UK Health Select Committee, Chief Medical Officers' Physical Activity Guidelines Expert Group), independent government reviews and other enquiries (e.g., on duty of care, safeguarding, sexual exploitation), podcasts (e.g. on sport and mental health, sports nutrition), professional body publications and expert statements (e.g., BASES The Sport and Exercise Scientist, afPE Physical Education Matters), voluntary organisations (e.g., National Children's Bureau), and online blogs (e.g., on sport and mental health, physical activity assessment).

Beyond REF2021

During the next REF period, departmental processes to support research such as PDR will encourage staff to engage in external research activities which are regarded as 'service' to our research disciplines and communities. Moreover, we want to expand the number of staff undertaking external roles contributing to the research base (e.g., journal editorial positions) and will proactively encourage colleagues to apply when such positions arise, with associated research time allocation to support staff in such roles. Furthermore, as more staff engage in future impact and public engagement activities that inform regional and national agendas, we aim to increase the proportion of colleagues who make wider contributions to society through engagement with research beneficiaries outside of academia, reflecting the culture we have established.