

Institution: University of Wolverhampton
Unit of Assessment: 24 Sport and Exercise Sciences, Leisure and Tourism
1. Unit context and structure, research and impact strategy <u>1a) Context and structure of the research unit</u> A Sport unit was initially submitted to the Research Excellence Framework (REF) in 2014. Nine staff were submitted of which two were female. The submission received a grade point average of 2.37 with 31.4% of the submitted outputs and 70% of the impact recognised as 'Internationally excellent'. The Unit continued to develop positively in this REF; we are closer to gender parity than before and have maintained our strong showing with regard to grant capture. Our PGR population has also shown an upward trajectory, increasing by 60%. Importantly, we also have a strong sense of community in our Unit, which helps our individual and team growth and development. In 2019, a consultative review of the Sport research environment and progress against objectives was undertaken. Subsequently, the Research Centre in Sport, Exercise and Performance was renamed the Sport and Physical Activity Research Centre (SPARC), better reflecting our research portfolio. SPARC is located within the Faculty of Education, Health, and Wellbeing (FEHW) and structured around three dynamic multidisciplinary and interdisciplinary research themes: • Performance Enhancement; • Physical Activity and Health; and • Sport Cultures; Equality, Diversity and Inclusion (EDI). These formalised themes facilitate dialogue between researchers to ensure that areas of long-standing specialism remain sustainable, whilst encouraging new areas of expertise (e.g. sports history) and increased inter-disciplinary working (e.g. research on exercise and the management of non-communicable disease). This has continued our legacy of research which supports health and social impact outside of academia. Performance Enhancement research has been widely accessed by competitive and recreational athletes nationally and internationally to improve performance. Examples of organisations changing professional practice as informed by our research include England Athletics, Wolverhampton Wanderers Football Club (WWFC), and Birmingham Royal Ballet. Category A staff contributing to this theme include Cloak, Devonport, Galloway, Lane, Maley, Nevill, Smith, and Wyon. Physical Activity and Health research focuses on understanding the role of physical activity in the prevention and treatment of disease and the promotion of health. Research findings from this group have informed guidelines provided by organisations such as the European League Against Rheumatism (EULAR), National Rheumatoid Arthritis Society (NRAS) for the management of symptoms, American Society of Clinical Oncology, Clinical Oncology Society of Australia, the American College of Sports Medicine, and MacMillan Cancer Support. Category A staff contributing to this theme include Cloak, Devonport, Koutedakis, Lahart, Lane, Maley, Metsios, Nevill, Smith, and Wyon. Sport Cultures; EDI research explores socio-cultural processes in order to understand their impact on participation, learning, and EDI within sport and physical activity cultures. This group has generated a large body of research interrogating the historical aspects of sport culture and policy, as well as enhancing collections in globally significant sporting archives.

Category A staff contributing to the Sport Cultures; EDI theme include Biscomb, Devonport, Lane, O'Leary, Ward, and Williams.

1b) Research objectives during the assessment period: How the Unit has performed and future plans

Progress against the five research objectives outlined in the REF2014 submission and our plans for the period 2021-2026 are:

i) Develop New Areas of Research Excellence and Build Cross Disciplinary Research

We have invested £2.393m on state-of-the-art facilities, including £340,000 installing a climate chamber and 15 camera 3D motion capture system. We have also appointed an environmental physiologist to develop research using the climate chamber (Maley, 2019). These investments are facilitating the development of new areas of research excellence for our UoA, such as environmental physiology and gait analysis. Additionally, annual Quality-Related (Q-R) investments are focussed on nurturing new areas of research excellence along with strengthening our impact case studies and increasing interdisciplinary work. Ongoing interdisciplinary projects involve colleagues from clinical exercise physiology, exercise psychology, pharmacy, immunology, neuro-oncology, physiotherapy, nursing, computing, and mathematics. Cumulatively, these investments strengthen the quality of our research through new research collaborations, networks and partnerships both nationally and internationally.

Future plans focus on the ongoing pursuit of funding and collaborative partnerships in order to maintain the rigour and impact of our work. To facilitate this future objective, in October 2020, we secured £498,224 of University Research Investment Funding (RIF) to resource an Exercise in Disease management and rEhabilitation (EDGE) research programme, drawing together expertise from colleagues from health sciences and computing to develop, deliver, monitor, and evaluate exercise interventions for those living with and beyond non-communicable disease.

ii) Increase European Collaborations

Five staff (Metsios, Lahart, Cloak, Wyon, and Smith) attended the University's 'New 2 EU' programme that offers researchers an opportunity to develop EU partnerships and coaching in grant writing. This has resulted in ten successful EU proposals and associated European collaborations (17 EU Universities, 7 research institutes, 8 policy making organisations and 6 industrial partners), many of which are prominent in the impact case studies. Illustrative EU grant awards are detailed in Section 3a.

In August 2020, we submitted two applications for ERASMUS+ funding to support further research examining 'exercise and medication'. These involve collaborations with the Dutch Arthritis Association, Reade (Centre for Rehabilitation and Rheumatology, Amsterdam), EULAR Centre of Excellence (Oslo), and Diakonhjemmet Hospital, Cardiology Department (Norway). Our work with European colleagues continues post-BREXIT and we are currently discussing proposals for new collaborative funding applications.

iii) Support and Grow the Research Student Community

An increase in research student numbers has been supported through securing eleven PhD bursaries; WWFC (four), Birmingham Royal Ballet (two), University RIF (two), and Elmhurst Ballet School, the Arts Council, Arts and Humanities Research Council (AHRC) - one each. Since REF2014, we have also increased the number of staff with a doctoral qualification from 13 to 22 expanding our pool of active PhD supervisors by 69%. This has contributed to a 60% increase in our PGR population from 15 to 24.

Our eleven PhD completions match the performance of REF2014, and Cloak and Ward additionally completed PhDs by publication in 2016. Future plans are to:

- Utilise the success (three completions in 2019-20) of industry-sponsored PhD bursaries to attract further industry investment.
- Facilitate industry investment and attract self-funded PGR students through new facilities such as the climate chamber and 3D motion capture system.
- Develop a Professional Doctorate in Health to align with the research interests of SPARC. From 2020-21 we aim to attract ten PGR students per annum through this pathway.
- Support the further growth and development of the Sport Cultures; EDI theme, to recruit more PhD students, creating further opportunities for the development of supervisory skills amongst staff.

iv) Promote Equality and Diversity in Research

Our commitment to equality and diversity is evidenced in the sport department becoming the first department to apply for the Athena SWAN Bronze Award in December 2017. While unsuccessful, positive feedback and noted areas for improvement have been actioned in a revised application submitted in November 2020. As part of our action plan, we run a University wide Athena SWAN seminar series to support career development addressing topics such as 'using your networks'. Lahart is working with the British Association of Sport and Exercise Sciences (BASES) to put together an online conference day to showcase and promote the work of those in the Sport and Exercise Sciences with a BAME background. In recognition of our work, the sport department Athena SWAN self-assessment team was shortlisted in 2019-20 for a VC staff award for staff excellence in the category of 'Valuing EDI'.

We have addressed EDI imbalances among staff through the appointment and promotion of both BAME and female staff. E.g., Williams and Devonport were appointed to Professor in 2016 and 2018, respectively. As chair of SPARC, Devonport provides a visible role model for aspiring female researchers. We continue to seek increased representation of BAME and female colleagues among those holding significant responsibility for research within SPARC. All University staff complete mandatory Diversity in the Workplace and Unconscious Bias training (renewed every two years). Our future plans are to:

- Sustain an environment that embraces diversity of research and researchers.
- Our research is impact driven (detailed further in section 1c) and we will continue to involve end users of research from the outset so that our research reaches intended populations and diverse communities at a local, regional, national and international levels.
- Ensure that EDI research remains a focus of SPARC research. This will build on research projects such as an Early Researcher Award Scheme (ERAS) funded project exploring the role that disability plays in the experience of University female staff and the Football Against Racism in Europe (FARE) Governance index project, a European wide project exploring gender and ethnicity at all levels of football.

v) Develop Staff at All Levels to Increase Depth and Breadth of Research

We have retained all staff contributing to our REF2014 submission except Griggs who took up a promotion as head of department at another HEI. There has been a significant number of internal promotions during the audit period. This includes two Senior Lecturers (Devonport and Metsios) promoted first to Reader and then to Professorial posts; two Senior Lecturers (Cloak and Lahart) promoted to Associate Professor and Reader respectively; and Lane becoming Faculty Associate Dean for Research. The professional development required to facilitate research promotions offers

benefits that extend beyond the individual to the wider research environment of SPARC, thereby facilitating the depth and breadth of our research.

1c) Impact from research and link to Impact Case Studies

We have facilitated the achievement of impact arising from our research findings by involving stakeholders in the co-design of our research from the outset. This includes professional sports organisations (e.g., British Judo, UKActive Research Institute) and health organisations (e.g., Action Heart, EULAR). This collaborative approach has helped attract industry funding (e.g., WWFC, Birmingham Royal Ballet) and facilitated access to patients and clinical expertise (e.g., Dudley group of hospitals). Our collaborators help us to evidence the health, economic, and performance benefits for target populations such as high-performance athletes and individuals living with non-communicable diseases. This is illustrated by two impact case studies which cover mitigating ill-effects experienced by dancers from their craft (Wyon, Koutedakis, Nevill, Metsios, and Galloway) and the benefits of exercise in living with rheumatoid arthritis (Metsios and Koutedakis). A related impact case study, developed in collaboration with and submitted under UoA3, addresses the benefits of exercise for those living with cancer (Lahart, Metsios, and Nevill).

These case studies have highlighted ground-breaking changes regarding the role of exercise in the treatment of rheumatism and cancer and in mitigating dance injury. Impact was achieved through strong and enduring relationships with stakeholders, which facilitated the opportunity for colleagues to be able to present research findings to critical peer scrutiny and to integrate them into relevant policy and practice. These vital relationships and processes support the sustainability of impact through financial, thematic and environmental continuity.

1d) Supporting Interdisciplinary Research

Supporting the interdisciplinarity of research is a key aim embedded in our Research Strategy (see Section 1b). We work closely with colleagues in the University's Research Institute for Healthcare Science and the Centre for Psychological Research to address the societal problem of managing non-communicable diseases. These synergies have helped produce two impact case studies submitted as part of the UoA3 return regarding breast cancer exercise pre- and rehabilitation and improving the wellbeing of populations at risk of emotional eating. Research Investment Funding across 2020-2023 has been awarded for an ambitious programme of interdisciplinary work led by SPARC that involves collaborations between clinical professors, lab-based health scientists, psychologists and computer scientists. This original, new research builds on the rheumatism and cancer case studies described in Section 1c with applicability on novel areas, providing access to a wider range of research expertise and infrastructure from across the University.

1e) Progressing towards an Open Research Environment

The University's Open Access policy requires all research outputs to be deposited online (WIRE) within three months of acceptance. Enhanced open access was supported in 2019 by the introduction of an online research information system (Elements) which supports the sharing of research. We exceed minimum policy requirements by enabling open access (via Elements) for book chapters and monographs. An example is the monograph 'A contemporary history of women's sport, part one: Sporting women 1850-1960' submitted for output review by Williams. Where appropriate, we also pre-register our work on sites such as the Open Science Framework and PROSPERO.

1f) Supporting a Culture of Research Integrity

Above and beyond adhering to principles of the *Handbook for Ethical Approval and Practice Procedures* (developed by the University's Research Policy Unit (RPU)) SPARC is influential in driving research integrity. A SPARC member and local lead for the UK Reproducibility Network (UKRN) was instrumental in the University's decision (as one of only 20 UK Universities) to join the UKRN. SPARC members form part of an open research working group, led by our Institutional Lead and two Local Network Leads (one a SPARC member). This group aims to foster a culture of research integrity and openness by supporting the development and delivery of UKRN activities (training, workshops etc.) across the University. One outcome of this group is the SPARC-facilitated Wolverhampton RIOT Science Club, a seminar series providing training in reproducible, interpretable, open, and transparent research practices among staff and postgraduate students.

All research projects are required to pass through a SPARC ethics committee where they undergo double blind peer review. Projects deemed to be complex or controversial are submitted to the Faculty Ethics Board for further consideration. As appropriate, research integrity and ethics are discussed as a standard agenda item during monthly SPARC meetings. Any issues identified are managed through the dedicated Research Integrity Manager within the RPU.

2. People2a) Staff

i) Staff Development Strategy

Staff development is central to our research strategy (see Section 1b; Objectives 4 and 5) with emphasis on actively nurturing, retaining and promoting our own staff, contributing to the development of a stable and sustainable research culture. We apply the principles of the Research Concordat to support the career development of staff for which we were awarded the European Commission's HR Excellence in Research Award in 2012, with re-accreditation successfully achieved in 2016. The research centre lead is involved in annual workload planning to ensure that research hours support the strategic objectives of SPARC. A University workload allocation model provides 180-1000 hours of research time for individual staff as follows:

- Scholarly and Research Activity hours based on the potential for research outputs, impact, citizenship, and income.
- 580- and 800-hours PA, respectively, for Readers and Professors for research activities.
- 180-hours of protected time for Self-Managed Research and Scholarly Activity to all academic staff (except Profs).
- 200-hours in year 1 and 100-hours in year 2 for new starters to facilitate research.
- 70-hours PA to complete doctoral study.

The stability of SPARC membership has enabled us to provide sustained mentoring opportunities for staff at all stages of their careers. This is via three means (1) all new staff appointments are provided time for research and allocated a mentor, (2) SPARC provides research mentoring organised within the three research themes, and (3) staff can become or seek a research mentor via the University Mentoring scheme. The mentor pool is supplemented by strategic visiting professorial appointments (see Section 2av below). In addition to mentoring, staff may apply for sabbaticals (see Section 2aiv below) and access a range of CPD opportunities supported by the appraisal process. These support structures (detailed throughout Section 2) ensure the sustainability of a vibrant research environment, e.g., when more experienced researchers retire.

Category A staff have increased from nine submitted to REF2014 to 15 in REF2021, a 60% increase overall and a 100% increase of female category A staff (11 male; 4 female). This is attributable to the retention of staff, internal promotions, appointment of research active staff (Williams and Maley), and support for research over the assessment period

ii) Staffing and recruitment policy

Whilst maintaining research and curriculum strengths, as part of our Athena SWAN and wider EDI commitment, we monitor staffing and recruitment. Strategies supporting our pursuit of EDI objectives include ensuring job advertisements highlight EDI and include the University Athena SWAN Bronze Award logo. We also use e-recruiter, a new anonymised shortlisting system.

There are 34 academic staff in SPARC of which 14 are female. Ten female academic staff do not have significant research responsibilities having selected a Teaching, Scholarship and Professional Practice role profile. Eleven new academic staff have been appointed during the audit period to fulfil the teaching of promoted staff, strengthen existing research themes and staff an increased UG sport portfolio. These include three lecturers (Kent, Niemz and Smith (R)) aligned to Performance Enhancement, two lecturers (Davies (P), Maley) and one SL (Davies (K)) aligned to Physical Activity and Health, and four staff including a Professor (Williams 0.6), senior lecturer (Forbes) and three lecturers (Best (0.5), Bywater, Richards) aligned to Sport Cultures; EDI.

iii) Support for individuals at the beginning of their research careers

Staff within SPARC may apply to a staff scholarship scheme for funding to cover doctoral fees, with 70 hours allocated annually in the workload to support completion. The University Early Career Research (ECR) Development Programme provides 30 annual workshops as well as drop-in sessions to support staff with the preparation, delivery and dissemination of research. Supplemental to this, SPARC organises an annual series of research seminars and CPD events. At these events, staff and PGR students present work, propose new research ideas, and explore potential collaborations with end-users, professional organisations, and other academics. Evidence of the efficacy of support offered is highlighted by eight PhD completions among staff within the assessment period.

An annual ERAS scheme is open to full-time and part-time staff within five years of doctoral completion. This provides successful applicants with a research budget of £5,000, 300 work-loaded hours, action learning sets and dedicated mentoring support (supplementary to any pre-existing mentoring). These support research, publications, and the development of additional funding opportunities. Since 2014, six members of SPARC staff (Best, Forbes, Kent, Lahart, Leflay, and Smith) have been awarded a place on the ERAS scheme, five of whom are female. Two previous ERAS recipients have progressed to Professorship (Metsios, 2016; Devonport, 2018) and one to Reader (Lahart, 2020) through the annual internal Professorial and Reader conferment process, evidencing the benefits of ERAS in nurturing a career in research.

Financial support for research is provided annually via Q-R funding (£30-72,000) to support SPARC's strategic priorities (e.g., staff teaching buy-out, buying in expertise and resources to support ECRs). Illustratively, in 2018-19 eight research projects were supported using Q-R funds, four with female leads (Devonport, Forbes, Smith, and Williams), four with male leads (Cloak, Metsios, Ward, and Wyon), and of the eight leads, four were ECR's (Cloak, Forbes, Smith, and Ward).

iv) Policy for research, impact leave/sabbatical leave for all staff

Staff at all stages of their careers may apply for a research sabbatical of one academic term or a non-resourced mini sabbatical of four to six-weeks. Four female staff received sabbaticals during the census period. Bowd and Williams were awarded one-term sabbaticals to respectively write up a PhD and finalise a history of British Olympic Women monograph. Bywater received a mini-

sabbatical to support PhD completion (six-weeks), and Forbes utilised a mini-sabbatical (four-weeks) to complete the Sport Department Athena SWAN Bronze Award application.

v) Procedures to stimulate and facilitate exchanges between academia, business, industry or public bodies

Visiting Professorial appointments and ongoing work with end users presents one strategy to facilitate exchanges between academia and industry. We work with a broad range of end users and sit on several influential boards and advisory groups, illustrated in Section 4. Over the census period, visiting Professorial appointments include Professor Ken Green (University of Chester), Professor Marie Murphy (Ulster University), Professor Greg Whyte (Liverpool John Moores University, Founder of the Centre for Health and Human Performance, Harley Street). Two 2020 appointments are: Wolman, who supports our performance enhancement research, and offers extensive experience in Sports Medicine having worked with professional dance companies, professional football clubs and with the British Olympic Association; and Carmichael, experienced in breast cancer treatment as a consultant, oncoplastic breast surgeon and researcher, supporting our research on exercise and living with cancer.

vi) How we recognise and reward staff for research and achieving impact

SPARC has nominated colleagues for the Vice-Chancellor's annual Staff Excellence Awards in the category of outstanding contribution to research on three occasions. Lane and Devonport were category winners in 2015 and 2017 respectively, and the SPARC REF team were runners up in 2014. We also recognise and reward research and impact through ERAS and sabbatical schemes, and the awarding of QR funds and/or conference funding.

2b) Research Students

i) Approach to recruiting doctoral research students

When advertising PhD bursaries, we profile information on EDI initiatives such as including the Athena SWAN Bronze Award logo in job profiles. To extend reach, we promote doctoral opportunities via social media, targeting a range of diverse organisations, collaborators and academic colleagues. The flexibility that we offer our PGR students (staggered start dates, part-time provision, supervisory meetings via online methods where necessary) allows SPARC to meet the needs of students with protected characteristics, and also to recruit PGRs from the UK and abroad. We also offer a pre-degree course for six months for students to get the level of digital, research, and analytical skills relevant for a postgraduate degree. If they progress with a PhD, the fees are waved.

ii) Evidence of studentships from major funding bodies

Our PGR numbers have increased with the assistance of studentships from major funding bodies and industry, e.g., receiving a £69,696 AHRC Doctoral Award (2018-2022) in collaboration with The Hockey Museum in Woking, Surrey. Following successful completions and outcomes, we have a second round of PGR studentships with WWFC and the Birmingham Royal Ballet. Studentships maintain industry links and contribute to the sustainability of a vibrant PGR community.

iii) Monitoring and support mechanisms linked to evidence of progress and successful completion

Progress towards degree completion is monitored at monthly SPARC meetings and during annual progress review (APR), the latter serving to quality-assure the supervisory process. Should a student fail to evidence sufficient progress during their APR, they are supported to develop a 3-month action plan to progress their studies. To support progress, all students complete a Personal Development Plan (PDP; guided by SPARC documentation) with their supervisory team to identify

training requirements. PGR students are then signposted to relevant training and research seminars provided by the University's Doctoral College, or discipline-based research training and seminars provided by SPARC. There have been eleven PhD completions since July 2014 and 24 PGR students are currently enrolled, 15 are part-time. APR reports demonstrate that PGR students are making excellent progress, with no issues raised.

iv) Support provided to research students in skills and career development

The University scores highly for research culture in the PRES survey, placing 22nd out of 103 HEIs in the UK (PRES2019). SPARC supports PGR students to develop their employability through encouraging research seminar series contributions, presenting at conferences, undertaking paid teaching, obtaining vocational experience, and research opportunities additional to their doctoral work. Former SPARC PGR students benefitting from this approach include staff members Kent and Metsios.

This process is facilitated by a PGR tutor (Smith) and two PGR student representatives, who complete an annual needs analysis and from this develop dedicated subject-based training.

2c) Equality and diversity

i) Study leave arrangements

At any point, academic staff may apply for a research sabbatical of one academic term or a non-resourced mini sabbatical of four-to-six weeks. During the REF period, four female colleagues have benefitted from study leave. Bowd and Williams were awarded one-term sabbaticals, respectively, to write up a PhD and finalise and publish a textbook. Bywater was awarded a mini-sabbatical to support PhD completion (six-weeks), and Forbes was given a one-month sabbatical to complete a Department Athena SWAN Bronze application.

ii) Arrangements for flexible and/or remote working

The University is committed to agile working. During the COVID-19 pandemic, remote working has increased considerably and will inform policy post-COVID. All staff take advantage of flexible working on an informal basis having at least one non-teaching day per week where they are able to focus on research. Staff attend campus where attendance is necessary for task requirements. Formal flexible working arrangements are authorised on a case-by-case basis. In SPARC, one female Professor and one male Professor have formally agreed flexible working arrangements with HR to support childcare.

iii) Career pathways for part-time and fixed-term staff

SPARC operates to the Wolverhampton Academic framework, introduced in 2018 enabling academic staff to position themselves, in negotiation with their line manager, within a career path that provides parallel progression routes for Teaching, Scholarship and Professional Practice (TSPP) or Teaching and Research (T&R). Each year, internal applications are invited for the conferment of Professorships, Readerships and Associate Professorships. The University has three routes to conferment available to all staff aligned with the three core areas of business: Research; Learning and Teaching; and Knowledge Exchange. Incentive schemes such as ERAS account for FT or PT status, operating for one or two years reflective of respective employment mode. Fixed-term contracts have been used to cover maternity leave and, owing to the temporary nature of these posts, have attracted ECRs.

iv) Facilitation of conference attendance or other necessary travel to support research

We strive to meet the specific needs of staff and students to support conference attendance and travel for research purposes, such as to identify strategically beneficial annual conferences and

encourage mass attendance among SPARC members. This supports attendance by facilitating car share, and room rate negotiations making attendance a possibility for a wider range of colleagues.

v) How equality and diversity considerations are taken into account in all support

Athena SWAN reporting has been a longstanding item on monthly SPARC meeting agendas. This supports the monitoring and evaluation of research opportunities, such as training, promotion and research leadership, to ensure equality for female staff and PGR students, e.g., an evaluation of the ERAS scheme highlights positive contributions to EDI objectives accrued from this scheme, with five of six SPARC recipients being female. This scheme has supported women in attaining research-based promotion (Devonport), and facilitated research activities that support the inclusion of female staff in REF 2021 (Biscomb, Devonport, and Smith).

To support underrepresented groups in preparing for promotion, we ensure that individuals with circumstances that might impact on research outputs and/or teaching and scholarship-related activities are appropriately supported, e.g. part-time staff, disabled staff, individuals with extended periods of leave. Q-R funds are also invested to support EDI objectives and, in 2018-19, resourced eight research projects, of which four project leads were female. In 2019-20, Q-R funding was used to support a female colleague returning from maternity leave by resourcing the undertaking and transcription of research interviews. Such actions support our gender equality action plan as detailed in our Athena SWAN Bronze Award application.

Whilst we acknowledge a need to attain greater EDI balance in Category A staff, and research leadership, we are reducing imbalance. Two female staff members were submitted to REF2014, increasing to four for REF2021

vi) Support for staff and research students returning from periods of leave and other absence

HR contacts returning staff on maternity or adoption leave to confirm their return date and carry out a risk assessment for returning mothers. Staff meet line managers before and after leave to ensure they are aware of all available support throughout the process, and to enable an appraisal to be conducted. We also ensure any workload changes for staff are minimised following leave, and remind staff of the flexible working scheme or opportunity to return to work part-time. Staff may request a timetable that enables them to work around childcare arrangements. During the REF period, one SPARC member returned from maternity leave on pre-maternity hours.

Following career breaks, or long-term illness, any request to change hours temporarily or permanently is made via a flexible working request. Following long-term illness, phased return to work, typically ranging one to three months, is managed via a referral to the University's Occupational Health providers.

vii) Support for staff with protected characteristics to enable them to research productively

The Equality and Diversity unit outlines policies and support for staff with protected characteristics profiled on the University's website. Section 1b (iv) offers illustrative examples of the EDI initiatives of SPARC that enable staff with protected characteristics to research productively. Additional to these, a SPARC specialist in disability research attends the Disabled Staff Network meetings to assist in the development, delivery and evaluation of initiatives intended to support staff living with a disability. Whilst at present we have no disabled staff, this engagement ensures that we maintain a strong position to offer appropriate support should the need arise.

viii) Approach to supporting the wellbeing of its staff and research students

Circumstances that might impact on the wellbeing of staff and research students are identified and monitored as appropriate via regular meetings with line managers/Director of Studies (DoS) and through appraisals/APR's. During the COVID-19 pandemic, an Equality Impact Assessment was

undertaken to ensure that no member of staff or research student was disproportionately affected by a return to campus. This includes risk assessments carried out by line managers for those staff identified as vulnerable, or by the DoS for PGR students.

3. Income, infrastructure and facilities

3a) Research Funding and Strategies for Generating Research Income

In our REF2014 submission, we reported £795,000 of research funding, of which £406,819 was derived from a successful proposal to the Economic and Social Research Council (ESRC). We were also awarded c£370,000 of European funding, which, although awarded in the period of REF2014, was drawn down entirely during the current REF period. For example:

- FUEGO (EU PF7 RISE project, 2013-2017: £107,146)

Collaboration between Sweden, Greece, UK, Brazil and Belarus to advance knowledge of specific mechanisms relating to obesity.

- U-GENE (EU PF7 RISE project, 2013-2017: £87,255)

Collaboration between researchers in Europe and Central Asia to investigate specific genetic polymorphisms of adipose tissue metabolism and their association with cardio-metabolic disease.

Research income during REF2021 amounts to £618,707. Examples totalling £591,099 from highly competitive sources include:

- HEAT Shield (Horizon 2020 grant, 2016-2021: £75,745)

Collaboration involving research institutions, policymaking organisations, and industrial partners from across the EU to examine the negative impact of increased workplace heat stress on health and productivity.

- VANGUARD Project (ERASMUS+ Collaborative partnership, 2020-2023: £342,530)

Collaboration between EU countries' Health Ministries and the World Health Organization to integrate physical activity guidelines within the curricula of five EU medical schools and for UK healthcare professionals.

- Wolverhampton Wanderers Football Club have funded four PhD studentships (£172,824).

In addition to funding detailed above, SPARC has been recharged for time and expertise offered in supporting funded projects in other UoA's or HEI's. This has presented opportunities for ECR's including Cloak, Lahart and Smith to gain relevant experience in preparing and delivering successful proposals. E.g., Lahart worked in collaboration with Action Heart and oncologists at Russell Halls Hospital to setup a cancer rehabilitation unit called Action Health (running since 2015) with the support of MacMillan funding (£75,000). Smith provided biomechanics expertise on a project designing products for people with dementia to support self-empowerment and social engagement (MinD project: Horizon 2020 MSCA-RISE; submitted to UoA32).

3b) Organisational Infrastructure

i) Organisational infrastructure supporting research and impact

We proactively utilise organisational infrastructure to support research and impact. E.g., we:

- Utilise support from the Project Support Office (PSO) to help develop research bids and if successful, utilise the expertise of project monitoring officers to compile financial expenditure statements and reports.

- Seek support and guidance from the RPU, which covers a range of research services such as research integrity, research systems, and impact.
- Encourage our PGR's to access the portfolio of training, seminars and activities on offer from the dedicated Doctoral College.
- Work with Human Resources Department to ensure that all HR policies, processes and procedures are adhered to in respect of research proposals and grants and contracts.
- Work with the dedicated and central business development support to develop industry links and grown the numbers of sponsored studentships.

ii) Infrastructure, facilities and expertise (and usage) supporting research and impact

The University provides the infrastructure, facilities and expertise to support impact in all its forms. Impact is supported by the Impact Team in the RPU. SPARC has an assigned member of the team who supports the planning, generation and reporting of research impact. This includes impact in developing award proposals, and impact in policy and practice engagement. The result is that impact is embedded deeply within SPARC's culture and activities.

One growing area of research excellence and impact results from ongoing collaborations with British Judo whose national centre of excellence has been based at Walsall campus since 2013, and with whom we share facilities and expertise. We have a collaborative agreement where SPARC works with Performance Director Nigel Donohue and the sports science and medicine team on targeted projects, and also in hosting sport science workshops. E.g., leading up to the Tokyo 2021 Olympics we are undertaking regular body composition and bone health scans for the Olympic athlete programme.

3c) Equality and Diversity

We value the benefits that a diverse student and staff population brings and see this as integral to the vitality of SPARC. Our infrastructure and facilities supportive of EDI objectives include the availability of signers and note takers for hearing and visually impaired staff and students, unisex washroom facilities, lift access to all floors/facilities and portable equipment.

3d) Research Infrastructure

i) Specialist research infrastructure and facilities

SPARC has eight sports and exercise science laboratories including: two large general exercise physiology laboratories (with multiple ergometers and metabolic analysis systems, Accelerometers, ECG, bio-impedance and Ultrasound), a biomechanics laboratory (3D motion capture, muscle stimulation, EMG, Tobi eye tracking glasses, dynamometry and XSENS 3-D motion capture suit), a climate chamber which sits in its own bespoke room (10 to 40C with normobaric hypoxia capability and humidity settings), a dedicated on-site DEXA facility ran by a full-time radiographer (also completing a PhD), a sports therapy suite, and a performance analysis laboratory (20 Hudl sports code licences), whose use is shared with a number of professional clubs in the region and for hosting coach education workshops. We also have a dedicated strength and conditioning facility used in collaboration with British Judo (with velocity-based training systems and eccentric training machines). In 2020, linked to a new 12-year partnership agreement with British Judo, the University committed £490,000 to extend medical and recovery areas. The benefits of our British Judo partnership are integrated into teaching, thereby enhancing the student experience.

ii) Cross-HEI shared/collaborative use of research infrastructure

Our collaborative use of research infrastructure involves sharing research facilities, expertise, and access to participants. Examples include the sharing of infrastructure with Russels Hall Hospital

and the use of University facilities (DEXA), with Porto University, Portugal (assessments of genetic variations in Wnt/ β -catenin and ER signalling pathways), and Thessaly University, Greece (biochemical analyses).

Recently, we shared use of the online survey software Qualtrics and collectively sourced translators to develop and disseminate a study of emotions and eating behaviour during the COVID-19 pandemic. With the support of colleagues from the University of Jyväskylä, Finland (Dr Montse Ruiz); University of Chieti, Italy; (Professor Claudio Robazza) and University of Northampton (Dr Chao-Hwa (Josephine) Chen-Wilson), this project accessed participants in 18 countries including China, Finland, Korea, Spain, UK and USA.

3e) Benefits in Kind

Benefits in-kind have been achieved by working with an extensive network of industry collaborators. Collaborations with BBC LabUK led in the first instance to the online project 'Can you compete under pressure', and subsequently the production of an iWonder resource. One resulting article (<https://doi.org/10.3389/fpsyg.2016.00413>) has received 40,375 views and an altmetric score of 389. The strategic use of media work to provide exposure and reach of work has facilitated ongoing research, invited publications, presentations and keynote talks, and further funding. E.g., the BPS funded project RESIST (Research-evaluated Endurance Strategies Intending to Support Training) which facilitated public engagements events and resourced the attendance a doctoral student (Robinson).

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

4a) Arrangements and Support for, and Effectiveness of, Research Collaborations, Networks and Partnerships

Over the census period, we have accumulated 97 international and 45 national academic collaborations. Our collaborative partnerships with colleagues in other HEIs bring about success via research income, outputs and impact. E.g., collaborative work between Nevill and Professor Marie Murphy (Ulster University) examining the health benefits of walking informed the 2017 Public Health England (PHE) review paper '10 minutes brisk walking each day in mid-life for health benefits and towards achieving physical activity recommendations. Evidence summary', in turn forming the basis for the Active 10 App developed by PHE.

4b) Relationships with Key Research Users, Beneficiaries or Audiences

Members of SPARC are actively involved with many professional, statutory, and regulatory organisations associated with sport and exercise science (see Section 4f). Through this, we enrich our research environment and extend the reach of our work to key research users. Staff hold positions on a range of advisory boards, resulting in our research informing guidelines provided by organisations such as the American College of Sports Medicine, American Society of Clinical Oncology, European League Against Rheumatism, International Association for Dance Medicine and Science, Irritable Bowel Disease Research Group, National Rheumatoid Arthritis Society, MacMillan Cancer Support, and UKActive Research Institute.

4c) Wider Contributions to Economy and Society

Contributions to economy and society not captured in the impact case studies include our extensive portfolio of research on sports History. We are the sole academic partner consulting with the FA in using the history of England (men's, women's, disability and futsal) as part of their high-performance elite development programmes at St George's Park. This has included

consultation on 1) The England caps wall; 2) The Sir Stanley Matthews installation; 3) The England captains' pavilion, and 4) The Iconic England caps cabinet display. Williams helped obtain a £150,000 Arts Council grant to co-curate a new exhibition of women's football at the National Football Museum.

We are the Higher Education partner for the museum 'The Silverstone Experience', with Williams the lead academic consultant. This is the first partnership between an HEI and a sports heritage visitor attraction in the world. Opened by Lewis Hamilton and Prince Harry, this was the largest (£19.2 million) new visitor attraction of 2020. Williams also sits on the advisory board for a non-profit global heritage association who are establishing a sporting museum in Doha following the Football World Cup in 2022.

4d) Engaging with Diverse Communities and Publics

As part of our strategy in engaging with diverse communities and publics, we proactively work with social media and media to disseminate our work to scientific communities and/or general public. Our expertise and standing in the applied sports and exercise sciences has prompted regular requests to translate scientific findings to practice for the benefit of the general public and sport and exercise communities. We have an extensive portfolio of media engagement presenting our research and free resources in lifestyle magazines such as *Marie Claire*, *Peak Performance*, *Runner's World*, *The National Student*, and *Take a Break*. We have also produced many educational videos, podcasts, webinars and online resources intended for the scientific community and general public. Many are produced in collaboration with external organisations such as BASES, Human Kinetics, Believe Perform, Food for Fitness, Guru Performance, Marathon Talk, UKRunchat and WWFC.

Accredited practitioners are aware of our work and, based on our long history of providing freely available resources for endurance athletes particularly runners, England Athletics teamed up with SPARC to provide support to athletes on their Marathon programme. This has resulted in a database of training programmes and physiological outcomes providing the case studies used during England marathon training camps. The data has also helped create training zones allowing athletes to train at a desired speed and intensity. We have also developed a partnership with Active Black Country, a hub providing timely data and learning in relation to physical activity and sport in the Black Country. We have also provided a series of public talks featuring elite runners and coaches such as Hayley Carruthers, Jo Pavey, Dr Martin Yelling to share expertise and ideas for future research.

We have worked with the BBC on several occasions and have featured as academic consultants in three episodes of 'Trust Me I'm a Doctor' investigating the following: 1) effects of stretching on blood glucose levels; 2) effects of resistance exercise, green tea, and ice-water on resting metabolism and fat oxidation; and 3) effects of accumulated exercise versus continuous exercise on blood glucose and lipids post-meal. We have also featured in a live BBC broadcast examining how dance science supports elite ballet performance, BBC2's 'Icons', and Channel 4's 'When Football Banned Women' both presented by Clare Balding.

4e) Contribution to the Sustainability of the Discipline

Our work, informed by established contacts with academics in other faculties or Universities and by sustained industrial partnerships, remains at the fore of international priorities. E.g., within our research theme Performance Enhancement, we have collaborated with the University's Departments of Endocrinology, Pharmacy and Rheumatology, Royal National Orthopaedic Hospital; University of Birmingham; and industrial partners SunVit, Consilient Health and Thorton Ross on a project examining different delivery methods for vitamin D and the effect of oral contraception on its bioactivity.

Within Physical Activity and Health, we collaborate with University Departments of Physiotherapy, Nursing and Public Health on a PHE-funded project endorsed by the Council of Deans of Health. This is in order to introduce change in general University curricula for healthcare professions to develop physical activity modules, enabling future healthcare professionals to discuss with patients with non-communicable disease the benefits of physical activity and, thereby, support the wider implementation of physical activity in healthcare.

In Sport Cultures: EDI, we have collaborated with Move-It-Or-Lose-It, a company providing exercise classes to older adults. During COVID-19, they commissioned us to undertake a service evaluation of their online exercise programme. Building on this, we are appointing a PhD student to undertake longitudinal evaluations and recommendations for best practice.

4f) Indicators of Wider Influence

i) Journal editorship

Many Category A staff hold senior editorial positions in reputable journals in the field. Prestigious examples include Nevill, who was editor in chief of the *Journal of Sports Sciences* (2001-2017) and is currently on the editorial boards of *Paediatric Exercise Science* and the *International Journal of Performance Analysis*. Williams was founding co-editor of the *International Journal of Football* launched by Routledge (2018) and has edited four Special Editions of Journals in this REF cycle; three for *Sport in History* and one for *The International Journal of the History of Sport*. Lane was Executive Editor for *Behavioural and Social Sciences* (2007-2019), on the editorial board for the *Journal of Sports Sciences*, the *Journal of Sport Science and Medicine* (2004-2019), and *Personality and Individual Differences* (2008-2018).

ii) Participation on grants committees

SPARC members sit on several grant committees: Lahart reviews grant applications for the Yorkshire Cancer Society and the Irish Cancer Society. Lane sits on the BASES awards and grants committee and has been a member of the ESRC review college since 2012. Metsios is a member of the following grants committees; Arthritis Research Campaign, British Heart Foundation, Cancer Research UK, NIHR, Physiological Society, Medical Research Council (MRC), and Rheumatoids Dutch. Williams is a member of the ESRC Global Challenges Research Fund (GCRF) Peer Review Group.

iii) Fellowships and visiting Chairs

Staff hold fellowships in key professional organisations including BASES (Devonport and Lane), the Royal Statistical Society (Nevill), the European College of Cardiology (Metsios), and IADMS (Wyon). Koutedakis and Metsios are visiting Professors at the University of Thessaly, Greece. Nevill is visiting Professor at Aston, Coventry, Ulster and Newman Universities, and adjunct Professor at the University of Limerick. Wyon is visiting Professor at University College London and also at ArtEz, Arnhem, The Netherlands.

iv) Prizes

The quality and impact of our research has been recognised with several awards in recent years. Lahart won best presentation for an ECR (BASES, 2017). Wyon received two national awards from One Dance UK (2019) for best Dance Science Research and Research Impact, and Ward received a best paper award (2019) at the Leisure Studies Association National Conference. Our paper 'How should I regulate my emotions if I want to run faster?' was named in the top 10 most impactful articles by the *European Journal of Sport Science* based on the article's originality, significance, methodological rigour and potential impact. In December 2020, Stanford University, with publishing house Elsevier and SciTech Strategies, released a ranking of 2% of the most cited

scientists in the world. Nevill, Koutedakis, and Lane were ranked 56, 239, and 286, respectively, out of 22,602 authors in the sport science field.

v) Membership of Research Council or similar committees

Our membership of research committees supports SPARC's international reach. Koutedakis is president of Exercise is Medicine-Greece and a member of Exercise is Medicine-Global. Lahart is a member of the publication committee, the early career committee and the communications committee for the Society for Transparency, Openness and Replication in Kinesiology (STORK). Lane is a member of the ESRC review college, and the UKactive Research Institute's Scientific Advisory Board. Metsios is a member of the advisory committee for Lupus UK, the Rheumatoid Arthritis Society, and the European League Against Rheumatism scientific committee. Smith is a member of an expert working party on guidance for rehabilitation and exercise for people with bone metastases for the Association of Chartered Physiotherapists in Oncology and Palliative Care. Wyon was President (2015-17) of the International Association for Dance Medicine and Science (IADMS), chaired the Research Committee for IADMS, and in 2020, set up and chairs the Professional Development Committee.

vi) Invited keynotes, lectures, performances, or conference Chair roles

In recognition of their expertise, SPARC staff have provided many keynote and invited talks representative of our three research themes. Illustrative examples for each theme include:

- Emotion: We have given invited talks and keynotes on various aspects of emotion including:
 - Emotional eating (Devonport: University of Jyväskylä, Finland, 2018); and
 - Emotions and performance (Lane: Training Peaks Coaching Summit, 2018).
- Women in sport: Williams has a long history of providing keynote and invited talks on women in sport, e.g.:
 - Researching Women's Soccer: an overview (International Women's Football Symposium Duke University, North Carolina, 2018); and
 - Up Front and Onside: The Women's Football Conference (The National Football Museum, Manchester, 2018).
- Rheumatic Disease: Metsios has given keynote and invited talks on Rheumatism as a renowned expert and pioneer in this area, such as:
 - Towards optimal exercise intensity (EULAR congress, Madrid, 2019); and
 - Implementation of physical activity in clinical practice: challenges and solutions (British Society of Rheumatology, Birmingham, 2019).

vii) Refereeing academic publications or research proposals

All Category A staff referee academic publications, and the majority also referee research proposals. Indicative exemplars include reviewers of grant applications for the AHRC, ESRC, Leverhulme Trust, MRC, and National Institute of Health Research. Examples of journals we referee include *Annals of Medicine*, *Educational Studies*, *European Journal of Applied Physiology*, *European Physical Education Review*, *Frontiers*, *Journal of Sport Sciences*, *Journal of Sport and Exercise Psychology*, *Journal of Applied Sport Psychology*, *Journal of Sports Medicine and Science*, *Sociology of Sport and Sports Medicine*.

viii) Co-operation and collaborative arrangements for PGR training

Lane contributed to a doctoral training event funded and organised by Leipzig University and participated in free online conferences in India on behalf of BASES. We received a network grant (Newton Fund) to collaborate with three universities in Brazil. As part of this arrangement, we hosted a Brazilian PhD student who shared expertise with our PGR community. We are currently

in the process of applying for a second network grant (Japan-UK) based on the success of this programme.