

Institution: Abertay University

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

1. Unit context and structure, research and impact strategy

UoA24 is a small highly collaborative and collegial unit administratively contained within the Division of Sport and Exercise Sciences, which is one of four Divisions in the School of Applied Sciences. Housed in the Kydd Building in the Bell Street Complex, the Division has been through a period of growth over this assessment period and has members across its two research groups. 2014 was Abertay University's first submission to the Research Excellence Framework in the Sport and Exercise Sciences, Leisure and Tourism UoA, and was based on 6 FTE. Our submission to REF 2021 is based on 11.6 FTE.

Abertay's research strategy is to produce high-quality research and knowledge exchange aligned with international, national and local priorities, and deliver real impact for society (see REF5a). Activity, collaboration and interdisciplinary innovation is driven across the University through implementation of our R-LINCS (Research-Led Innovation Nodes in Contemporary Society) Research and Knowledge Exchange Strategy. Within the REF assessment period Abertay has operated under two Strategic Plans: R-LINCS (2014-19) and R-LINCS2 (2020-25). R-LINCS is driven by a University-wide Research Executive responsible for enhancing the development of a sustainable research environment through strategic investment, review and cross-cutting support, structures and initiatives; a UoA24 member of staff is a Research Executive member. The Research Executive interacts directly with the University Executive, the Schools and the University Research and Knowledge Exchange Committee (RKEC), to promote and facilitate a thriving, inclusive and collaborative research environment, and enable impact within and across research units. As outlined in Section 3, the UoA has benefited over the assessment period from significant support and investment from the School and University in research and impact infrastructure, new research appointments, dedicated technical support and development of laboratories to accommodate additional areas of research activity and add capacity for future impact collaborations.

Our campus co-location and UoA's appetite for collaboration enables us to work effectively across discipline boundaries. Collaborations within Abertay have extended the scope of our research activity (for example, research on cardiovascular function of prolonged supplementation with omega 3 in older adults in collaboration with the Division of Engineering and Food Science) and offers the potential for innovative projects of a much greater scope to be pursued in the future that would not otherwise have been possible (e.g., developing e-sports research taking advantage of a £5.5M investment in the School of Design and Informatics which includes an Emergent Technology Centre). Our approach to enabling impact also involves working directly with stakeholders outwith the University in order to translate our research findings into innovative solutions that enable improved outcomes at the heart of the unit strategy. Our proactive and selective approach in identifying potential beneficiaries significantly enhanced the level of research activity and sustainability of our research environment, as evidenced in our selected impact case studies.

We have increased our research income by 34% (REF4b), number of postgraduate research students by 94% (REF4a) and quality of research outputs (REF2; and Web of Science citations have increased by 212%) during the REF2021 assessment period compared to the 2014 REF submission. We also have been highly effective in generating knowledge exchange income (£2,664,273; Section 3) and enabling impact (REF3).

The UoA context and structure has allowed us to meet all of the strategic aims set out in the last assessment period, and our thriving environment also supports our future strategic aims and goals for research and impact.

Achievement of strategic aims for research and impact during the assessment period

The 2014 REF submission set out a commitment to: 1) further develop the research groups; 2) increase the number of postgraduate research students; 3) increase research income; and 4) increase dissemination and public engagement. All of these strategic aims for research and impact have been achieved during the assessment period, and evidence is provided below.

1) Further develop the research groups.

In order to meet this aim, the University has funded the expansion of the UoA's research groups since the last REF through the establishment of a new professorial role to provide research leadership, 7 new academic posts and a dedicated technician who also draws in expertise from the wider technical team (outlined in Section 2). Significant investment (£2.75M) has also been made during this assessment period in new research laboratories (outlined in Section 3). The number of research active staff returned in this assessment has increased from 6 in 2014 to 11.6 in 2020. Two research groups have been established during the assessment period (*Biomechanics and Physiology*; and *Social Science of Sport*) as part of our strategy to enhance the quality of our research and impact.

A review of the staff base and interests (in 2015) led to a refocus of research groups. Related to these staff strengths and interests there were two clear groups, a biomechanics and physiology group, and a social science of sport group. The Head of Division took a strategic decision to develop the groups in these two complementary areas. Due to the diversity of sport and exercise science, this was an effective way for shared interests to be developed and also to align research with the University strategy and structure, including for integration of post-graduate research students into the disciplinary specific research environment that complements the Abertay Graduate School provision. These research groups provide supportive structures that enable researchers to meet with peers who share a methodological and/or subject interest. Groups have a fluid membership which can vary according to topic, and some individuals are members of both. Each meet up several times per academic session, and provide supportive peer review (for ideas, presenting research) and act as an academic sounding board for research. Postgraduate Research students (PGRS) are regular and active contributors, and each group has collaborated in bringing at least one high profile research related flagship event to Abertay, for example, Biomechanics and Physiology (BASES 2019 Student Conference) and Social Science of Sport (Leisure Studies Association 2019 Conference).

Research across the two groups has concentrated during the assessment period on current research challenges in the field involving populations with protected characteristics (e.g., age, gender, disability). This research contributes to the welfare and safety in sport agenda, which has growing salience as an issue in sport locally, nationally and internationally. The approach of the UoA to supporting and enabling impact in this distinctive area is to work directly with stakeholders in order to translate research findings into innovative solutions that enable improved outcomes. For example, one of the selected impact case studies outlines how our research has contributed to reversing a significant sports participation drop-out from the Gaelic Athletic Association in Ireland among 12-16 year-old male participants. Our strategy has led to the establishment of a sustainable network to support sport participation in youth sport populations.

Our second selected impact case study outlines how our research has influenced professional practice and improved outcomes of sport support services in the United Kingdom, Australia and New Zealand. Working directly with elite sport wellbeing practitioners, our approach has translated the findings into easy-to-use tools that have enabled effective changes in the practice of career transition support to improve outcomes at individual, sport and organisational levels. The impact of this research was publicly noted in a Parliamentary debate on sport in the UK and an impact campaign by the English Institute of Sport.

In addition to the selected impact case studies, our strategy has enabled impact in other areas. For example, research on high intensity in the physiology and biomechanics area is being applied across performance settings. For example, programmes developed on the basis of the UoA's research has supported elite kickboxers with a new way to train, culminating in one kickboxer becoming world champion. The research has also underpinned the work of sports coaches, and the development of a local company (i.e., HIIT IT).

2) Increase the number of postgraduate research students.

The UoA has significantly benefitted from the development of the Abertay Graduate School with regard to its vibrancy and critical mass (outlined in Section 2). The number of doctoral degrees awarded to students supervised in the UoA is 5 (there were no doctoral degrees awarded in the 2014 assessment period) and our PGRS registrations in the cognate area of Sport and Exercise Sciences, Leisure and Tourism has increased from 8.5 in 2013-14 to 16.5 in 2019-20.

3) Increase research income.

Research income (REF4b) has increased across this assessment period, but the UoA made a strategic decision to focus more on knowledge exchange to help generate further income and drive our approach to income. As outlined in our 2014 submission, the Scottish Government made a significant investment in the Dundee Academy of Sport (DAoS; further details provided in 4th strategic aim below: *Increase Dissemination and Public Engagement*) and this is not returned as research income as it was a project funded by the Scottish Funding Council. This presented us with a unique, fixed time-frame opportunity which was the main focus of our attention during the assessment period. This helped the UoA generate £2,664,273 in knowledge exchange income across this assessment period.

4) Increase dissemination and public engagement.

Dissemination and public engagement has increased during this REF period through a number of impact strands. The DAoS was created to help achieve this aim through targeted dissemination routes with a range of stakeholders (schools, colleges and community groups) using sport research as a vehicle for widening access to education. Since January 2014, we have worked with 90 schools to deliver 1337 sessions underpinned by sport research to 40114 school children from predominantly SIMD20 (Scottish Index of Multiple Deprivation) backgrounds. During this assessment period, the DAoS also engaged directly with, and accessed the networks of, a number of local partners in order to disseminate research: an articulation and access programme to support college students progress to university level study (307 sessions delivered to 6055 students); a CPD programme for sports professionals and volunteers (162 sessions to 4626 individuals); and summer camps (75 sessions delivered to 2504 individuals). Recognition of our impact includes: Shortlist for Best Partnership Award (Herald Higher Education Awards 2016); Silver Game Changer Award (Legacy 2014); Game on Scotland Legacy Award (Legacy 2014); and Partnership Excellence Award (Angus Council 2014-15 and 2015-16).

During the REF period, we proactively contributed to popular science events (e.g., Dundee Science Festival, Pint of Science) and staff regularly make presentations to non-academic audiences (e.g., Leisure and Culture Dundee, Hawkhill Harriers, Caley Cricket, Café Science, Dundee Women's Festival) as part of the UoA's strategy to increase dissemination of our research.

The University's External Relations Department receives fortnightly updates from us, detailing research awaiting publication, with projects that have suitable public interest potential taken forward for promotion. The level of media uptake on press released articles is recorded via the communications distribution system and communicated to staff through a weekly media bulletin. Website traffic and social media impact from research is recorded on a quarterly basis, and part of the UoA's strategy was to extend the reach of the media coverage of our research. Over the

assessment period, the UoA has contributed to 110 media outputs related to research. This is significantly more than during the previous assessment period and includes more international and national media coverage. This has helped raise our profile and facilitate the establishment of new research partnerships, which are central to our impact strategy.

UoA staff have published 121 journal articles, 3 books and 21 book chapters during the assessment period. Compared with REF2014 assessment period, Web of Science citations have increased by 212%.

Future strategic aims and goals for research and impact

To build upon the success of achieving our strategic aims during the assessment period, the future strategic aims and goals for research and impact for the UoA are:

- Maintain and enhance areas of research distinctiveness, while facilitating the development of research in areas to address emerging challenges across society.
- Further extend research and impact activities at the highest attainable quality level.
- Build research grant income sustainability.
- Increase the number of PGRS to contribute to the vibrancy of our research environment.
- Increase the impact of our work by enhancing current collaborations and developing new partnerships regionally, nationally and internationally.

We will achieve these aims and goals over the next REF period through the following activities:

- Maximising the originality, significance and rigour of research outputs, with the expectations that the majority will be at least internationally excellent in quality.
- Increase research grant submission and acquisition, and the number of staff holding grant awards through an increase in the diversity of sources. Collaborating with other groups across the University (for example with Computer Games in relation to eSports research, provides an excellent opportunity to the UoA to increase research grant income).
- Provide all staff with enhanced support, training, development and communication opportunities.
- Work directly with key research users and beneficiaries in order to translate the findings of our research to enable effective changes in practice to improve outcomes for government-affiliated organisations, professional associations, and third sector organisations.
- Prioritise research on safety in sport and exercise by building upon interdisciplinary and collaborative links.
- With regard to planning, we will remain flexible especially with regard to some aspects of the UoA that have been affected by the impact of COVID-19. The Biomechanics and Physiology group, in particular, have been unable to continue some laboratory-based research with human participants due to Scottish Government restrictions, and there may be ongoing challenges conducting some aspects of this research moving forward. In addition, some impact activities had to be suspended. At the end of the assessment period, the principles that intend to inform our strategy for the environment in the next period are supportive and will help the Unit continue to be agile and resilient. For example, the University principle that staff are able and encouraged to work across all existing facilities, will allow the Unit to further collaborate with colleagues across the University in general science (e.g., molecular biology, food science) to a much

greater extent when permitted under COVID-19 guidance. The Graduate School has also put in place support for PGRS (including funding, on-line training, frequent Q&A sessions) to ensure that the quality of research is not compromised.

Our future strategic aims, goals and activities are aligned with the university's new Research and Knowledge Exchange Strategy (R-LINCS2 2020-2025) (see REF5a). This alignment ensures a sustainable base for internal support and collaboration across disciplines during the next REF period. Abertay have made a strategic commitment over the next five years to invest in and support c.15 fully funded PhD studentships, funded PhD studentships for newly appointed academic staff (subject to the approval of a research plan that is aligned with the RKE strategy objectives), Abertay Futures Scholarships, Pump Priming awards, and Open Access Publication awards.

2. People

Staffing strategy

Our University Strategic Plans affirm Abertay's core purpose to develop and sustain an inclusive and supportive environment, welcoming and retaining students and staff from a diverse range of backgrounds and inspiring our students, staff and graduates to achieve their full potential and to have a positive impact on the world.

The key objectives of the UoA staffing strategy are to:

- achieve a sustainable, supportive and productive staffing structure that promotes equality and diversity;
- attract and develop talented, high-performing research-active staff that strengthen our reputation in areas which enhance our academic programmes, thereby ensuring a sustainable, vibrant and collaborative researcher community;
- enable all academic staff to be demonstrably research active, and to contribute explicitly to recognition of individual and collective research excellence;
- provide resources strategically and flexibly to support the development of researchers, including our PGRS, and to enable timely responsiveness to emerging opportunities; and
- ensure research students are engaged fully with our research environment, including the Graduate School's programme of research development activities and events.

Since 2014, the UoA has made 7 academic appointments of which 2 have been replacement posts. Investment in academic posts has been strategic, aimed at balancing experience for research leadership, building capacity in areas of research excellence and developing the next generation of researchers. These appointments have included lecturers in Physical Activity and Health, Biomechanics, Strength and Conditioning, Sports Sociology, and Sports Development. We also proactively identified a need for a new appointment at Professorial level, and this appointment has supported a step change in both quantity and quality of research outputs, grant applications and research income through mentoring across our two research groups.

The team of academic staff (4 female and 12 male; one part-time female) comprise one Head of Division, one Professor, 2 Senior Lecturers and 12 Lecturers. All Category A eligible staff are on permanent contracts. Over the assessment period, 18 applications were submitted from 11 members of staff for promotion (7 successful). Equality and Diversity data prior to 2017 are unavailable, but since, 7 appointments were made from a pool of 42 applicants. Appointments were 29% female, average age = 34, 0% BAME, 0% LGBT+ and 0% declared disability.

Staff development

R-LINCS (2014-19) focused support and activity around four overarching cross-University themes (Environment, Security, Society and Creative Industries), to drive the development of research excellence and impact. R-LINCS2 (2020-25) will build on our successes and accelerate impact through an integrated strategy across the institution, driving and coordinating actions at

individual, School and University levels. Strategic RKE activity is focused within and across Challenge Spaces (Creative Industries and Cultural Vitality; Health and Care across the Lifespan; Security, Equality & Social Justice; Sustainable Development & Inclusive Living) addressing key local, national and international priorities that our research base best positions us to respond to. These will be addressed by drawing on our Pooled Excellence research expertise, which represent cross-institutional ways of working. Researchers will be able to align with one or more areas to encourage collaboration, and cross-fertilisation of ideas and expertise.

The University, and Research and Knowledge Exchange (RKE), Strategic Plans identify supporting staff development as central to achieving our ambitions. All new staff and PGRS receive a mandatory and comprehensive Induction Programme and information pack which identifies sources of RKE support, as well as key information such as the University Postgraduate Research Degree Regulations and Handbook, the University Research and Knowledge Exchange Strategy, Concordat to Support Research Integrity (CSRI), Concordat to Support the Career Development of Researchers (CSCDR), Concordat on Open Research Data (CORD), Concordat for Engaging the Public with Research (CEPR) and Knowledge Exchange Concordat (KEC). This includes substantial guidance on the ethical pursuit of research and the avoidance of research misconduct (including plagiarism, and breaches of GDPR for Research and IP rights). Informal communication with and between the Abertay research community (staff and students) is aided via a social media tool (ARC Yammer) to encourage discussion, awareness and to promote collaboration and interdisciplinarity.

Staff development is supported by regular research planning, internal peer-review of research grant application proposals, pump priming for research (e.g., pump priming investment to support research in golf during COVID-19), sabbaticals and conference funding. Mentoring for research and impact activities is supported through a Cross-Institutional Academic Mentoring Scheme (TRAM) with the University of Dundee, University of St Andrews, Glasgow School of Art, James Hutton Institute and Trinity College, Dublin; the UoA has had 2 mentees and 3 mentors engaged in the TRAM programme during the assessment period.

Consistent with the CSCDR, all staff have personal Development Discussion meetings (formerly Pathways to 2019) with the Head of Division on a bi-annual basis. These formal discussions are designed to appraise both short-term research objectives and long-term plans, discuss training and development needs, and review any well-being or workload issues. In 2020 the University introduced dedicated 3-year rolling Research and Development Planning for all academic staff. Staff and PGRS have access to over 100 discipline-specific, advanced and higher-level researcher development opportunities, seminars and training workshops delivered via the Graduate School. Examples include, grant writing workshops, training for research managers, research methods and statistics modules, enterprise training and competitions, understanding Intellectual Property and Copyright, GDPR, data management, and ethical conduct, to ensure research is conducted according to appropriate frameworks and standards. PGRS can tailor their professional development training to their specific needs and career aspirations. The Graduate School also offers one-to-one support with research design and statistical analysis, publishing and grant writing, the development of enterprise bids, and public engagement events. The UoA is also committed to Open-Access publication, supported by the University fund for open-access journal fees.

UoA staff have access to three Researcher Development Staff: a Statistician who is available to all researchers for advice or collaboration and hosts regular training and drop-in statistical workshops; a Public Engagement specialist, who also manages the Nuffield Research Placement for Scotland and the Dundee Primary Schools Science Week and a Senior Developer to support the development of research plans, academic writing (grant and fellowship applications) and impact, through workshops, individual support and a 'Writing Academy'; and.

UoA researchers are also supported in knowledge exchange aims (e.g., with industry and the public sector) via two Academic Enterprise Leaders (academics with excellent track record in

developing KE) available centrally to promote, advise and mentor staff towards developing research impact.

There is a probation period of 2 years for new appointments which includes regular objective setting and discussion with the Head of Division. Depending on experience, staff may be also required to complete the university's Postgraduate Certificate in Academic Practice (PGCAP). This qualification has a research focus as well as developing teaching skills, including modules such as 'Developing Academic Practice' and 'The Effective Research Academic'. These focus on: informing staff about the local and national contexts of regulations, codes of practice and policy that underpin postgraduate education, research and research supervision; introducing staff to a body of best practice methods underpinned by pedagogic knowledge to support staff development as professional and effective research academics; promoting opportunity for staff to build confidence and develop practical skills and networks in order to effectively balance and integrate all areas of academic practice (research, supervision and teaching); developing a critically reflexive approach to academic practice; and supporting the development of individualised continual professional development and implementation plans for effective practice. All UoA staff who are inexperienced in postgraduate supervision are required to complete an online Epigeum course on Supervising Doctoral Studies and our in-house training before taking on and being mentored through a first PGRS supervision (100% of unit staff have completed this). Those new to Research Degree examinations must engage with the Novice Internal Examiners Process which involves in-house training and observation of *viva voce*.

Abertay recognises that researchers are often best placed to develop their research into new products or applications which offer solutions to end-users. Therefore, in 2016, the University introduced an open Intellectual Property (IP) Policy, giving researchers free access to the IP they generate (with the exception of specific identified circumstances).

Training and Supervision of PGR Students

The University is committed to the provision of training, development and support for all its PGRS to ensure that they develop the intellectual, research and transferable skills needed to enhance their research effectiveness, employability and career development within an increasingly competitive employment market. The pan-University Graduate School was launched in 2014 as part of our R-LINCS Strategy and during this assessment period it has transformed the quality of the UoA research environment.

Situated centrally within the University, all postgraduate students and academic staff are given membership of the Graduate School and have access to our dedicated flexible study and social spaces – a forum in which they can meet, work and learn with other researchers and postgraduates from across the University. The Graduate School offers open-plan and extended access to PCs with general and analytical software (including SPSS, N-VIVO, R and specialist by request) and access to electronic publications, bookable meeting rooms, a seminar room, a kitchen with refreshments, printer facilities, telephones and lockers, permanent or hot-desk facilities according to need. PGRS access discipline specific facilities and laboratories from across the University as appropriate to their needs and regardless of their nominated principal host School. PGRS also have access to all University Support Services including Information Services (Library and IT support) and Student Support (including welfare, careers and academic support).

As well as providing a physical space, support and access to an extended and diverse peer group of PGRS, the Graduate School creates a structured system to support progress:

- The Graduate School develops, coordinates and provides over 100 training and professional development opportunities [e.g., research methods, statistics (SPSS and R), qualitative analysis] annually to our PGRS and research community, and offers help with funding applications, academic writing and publication, research impact, business development, placement opportunities, training for teaching and teaching opportunities,

research design and statistical support, public engagement and outreach activity. The programme of activity is flexible, allowing customisation to suit the research area and individual needs and aspirations, so that PGRS are developed as professional researchers within their discipline context (informed by EUA Salzburg II Recommendations; Vitae Researcher Development Framework (RDF); QAA UK Quality Code Chapter B11 and UK Quality Code for Higher Education, Research Degrees). The co-location of PGRS also serves to promote integration, collaboration, informal support groups, mentoring, networking and a multi-disciplinary research and working ethos within the University community. PGRS have several formal (e.g., representation on the University RKEC) and informal routes [e.g., the Postgraduate Research Student Survey (PRES), and the Graduate School Forum and Rep system] for providing feedback, which allows us to monitor responses against national benchmarks and address any issues should they arise.

- Personal development planning: PGRS use our ADEPT tool (based on the Vitae RDF) to plan their professional (training needs) and personal development goals and track their ongoing achievements. (e.g., career development, dissemination, statistical training, impact experience), which must be submitted for approval one month before their final thesis submission. This ensures that students are systematically focused on progress, and that they are able to articulate all of the research, experience and wider achievements attained throughout their PGRS training.
- Annual Progress Reviews: students and supervisors complete an annual progress report and presentation reviewed internally by a panel of senior researchers (Research Degrees Assessment Panel), with both supervisor and student speaking separately in private to the panel after the presentation. This not only provides an annual check on student progress and an opportunity to address any issues in a timely manner, but also gives the student the opportunity to practice addressing questions about their research decisions in preparation for viva.
- Annual Graduate School conference: All PGRS present their research to peers, supervisors and academic staff from across the university. This helps students to develop presentation skills and confidence in a formal professional context. PGRS have been encouraged to present at external conferences and support conferences hosted by the UoA (e.g., the British Association of Sport and Exercise Sciences Student Conference 2018 and the Leisure Studies Association Conference 2018).
- Funding opportunities: students can apply to a fund for conference attendance and researcher training support (funding awarded to 2 students across the assessment period). They can also apply to the Chancellor's Fund (since 2018-19), which has assisted two PGR students to meet expenditure relating to their specific area of research, including expenditure on travel, conferences and networking opportunities.

The growth in number and success of our postgraduate student base has been a notable component of our improved research environment during the current assessment period. Over the assessment period, the number of PGRS registrations has increased (2013-14: 8.5; 2014-15: 15.5; 2015-16: 15; 2016-17: 16.5; 2017-18: 14.5; 2018-19: 12; 2019-20: 16.5). Studentships have been funded through external and competitive awards (e.g., Carnegie Trust, Northwood Trust). Studentships are also funded through internal investment, including winning 3 out of 32 R-LINCS studentships available through open competition across the University, and one Abertay Futures Scholarship (fee waiver awarded to excellent postgraduate students who undertake research in areas of strategic priority to the University). The UoA also provides regular funding for research equipment to PGRS. For example, the purchase of a Zephyr Bioharness 3 for PGRS studies related to sprint interval training led to a published output by the research student in the *Scandinavian Journal of Medicine and Science in Sports*.

Supporting their career development, PGRS are authors on 15 published papers this assessment period and have presented at over 40 conferences. Our PGRS have achieved

excellent success after graduation, going on to lectureships (e.g., Chapman University in the United States) as well as relevant employment outside of academia (e.g., Clinical Trials Data Manager).

Supporting and Promoting Equality and Diversity

The UoA supports and promotes equality and diversity in research careers through the University's Equality and Diversity Framework, which guides and supports the University community. Since REF2014, the University has been awarded the Athena SWAN (AS) Bronze award (2015 and 2018). Abertay was one of the first universities to sign-up to the Race Equality Charter pilot in 2014, and in 2016 we became and remain, the first and only Higher Education Institution in Scotland to hold the Race Equality Charter Mark bronze (RECM). Our AS and RECM action plans are embedded within a comprehensive and mainstreamed Equality, Diversity and Inclusion (EDI) Action Plan covering the range of protected characteristics. We have held an NHS Scotland Healthy Working Lives Gold Award since 2016, and a Living Wage Foundation Award.

Abertay is fully engaged with (and a signatory of the CSCDR & KEC) the principles of the CSRI, CSCDR, CORD, KEC, and CEPR, which we use to guide development of supportive RKE policies, practices and structures. We are compliant with our CSRI commitments; all staff, students and visiting researchers are required to adhere to the highest standards of integrity in the conduct of their research as set out in the Abertay Research Code of Conduct, and engage in mandatory research integrity training (including GDPR for Researchers).

Aligned with our strategic aims and our commitment to enabling our staff and researchers to excel in an inclusive, healthy, supportive environment, since REF2014 we have reviewed our structures for EDI governance, management and involvement. The University's ethos is one of embedding inclusion, diversity and equality in all our policies, operations and strategic thinking. We seek to recognise and value colleagues and students with different backgrounds, experiences and attitudes who bring fresh ideas and perspectives to the University. Supported by our People Services team, all managers hold responsibility for implementing the University's EDI policies, and we manage our progress in this area through our Inclusion, Diversity and Equality at Abertay (IDEA) Management Group. This Group also monitors implementation through annual reporting and our governing body, Court, has oversight of our work in this area through its People, Health & Equality Committee, which received regular reports including our Mainstreaming Reports. The University consults the Trade Unions on EDI through regular Joint Liaison Committees and works with Abertay Students Association on student EDI matters; members of the unit have been involved in these groups.

A fair and inclusive environment is promoted by ensuring that all those involved in research-related decision-making undertake appropriate equality and diversity training and that decision outcomes are assessed via EIAs at key process application stages. Also, all Abertay University staff are required to undertake on-line training in Diversity at Work and Unconscious Bias and all those involved in making REF 2021 related decisions completed these courses before contributing to any decisions regarding staff or outputs. In addition, all Heads of Division have undertaken a substantial Leadership and Management Development programme, including specific elements on equality, diversity, inclusion and unconscious bias. The aim for the combination of the training courses is to ensure that all those involved in Abertay's research processes: have an understanding of the legal framework for equality, diversity and inclusion; understand the concepts of discrimination and unconscious bias; have an awareness of how discrimination and unconscious bias might arise in our research processes and how to avoid that; and are able to ensure that our research processes promote an inclusive environment.

The University has taken steps to make sure that equality, diversity and inclusion is at the centre of the UoA's REF 2021 work. This includes the development of the REF 2021 Code of Practice, which describes the processes, procedures, and decision-making principles that we have followed to ensure a fair and transparent approach to building an inclusive 2021 REF

submission. The Code of Practice is aligned with the University's overarching Equality Action Plan, which addresses equality, diversity and inclusion across all protected characteristics. It is the same for all UoAs and our UoA had representation on the Working Group that developed the code of practice. Therefore, our guiding principles for our approach to the REF include: taking account of our current and historical context and our current strategic aims; recognising that academic roles vary and value different types of academic role and varied career paths; supporting academic staff development, including development of research independence; being underpinned by equality, inclusivity and fairness, ensuring that all staff are treated with dignity and respect; taking account of staff circumstances that have affected an individual's or unit's ability to work productively throughout the assessment period; and ensuring transparency, consistency and accountability in all our decision-making processes in relation to REF.

Flexible working is fully supported, with staff able to work remotely where needed (or necessitated during 2020) as part of the University's Digital Strategy launched in March 2020. The terms and conditions of part-time and fixed-term staff are the same as equivalent full-time staff (pro rata).

In 2018, Abertay established the Lead Voices initiative through which staff and students with direct or academic experience in protected characteristic groups, volunteer to act as voices advocating for their peers, thereby providing more visible routes for input and impact assessment of the University's developing policies and strategies. Members of staff from the UoA have been directly involved. Through these structures, we identify issues that are common across the University, ensure consistency of practice and enhance accountability for resolving EDI issues.

3. Income, infrastructure and facilities

Income

As outlined in Section 1, the UoA has had a mixed economy of income related to research and research impact following a strategic decision to focus our attention on knowledge exchange during a fixed period of time. A total of £2,664,273 in knowledge exchange income has been generated across this assessment period, including the flagship Dundee Academy of Sport project, and we have capitalised this to drive our approach to impact.

Going forward, the UoA has aligned itself to collaborate with other groups across the University on eSports research and research impact. Abertay are a lead partner, with Northern Lights Arena Europe Ltd and Dundee City Council, on a revolutionary new 4,000 seat eSports arena and academy opening in Dundee by 2024 at an estimated cost of £40-60m. This new development will stimulate new R&D and educational opportunities to the eSports domain and further cement Abertay's and Dundee City's role as a world leader and hub for computer games. This presents an excellent opportunity for the UoA to increase research grant income.

Infrastructure and Facilities

UoA research and impact applications are supported by the University's Research, Enterprise and Innovation Services (REIS), Graduate School and ethics committees. REIS identifies and disseminates relevant opportunities for research funding. REIS offers advice and support to the UoA on research related matters, including costing, reviewing and approving applications for external funding, processing and managing grants awarded. Graduate School resources (e.g. Researcher Development staff, training seminars) are available to all staff, and are widely used. These university-wide points of contact provide excellent pooled expertise to support staff to build research grant income. The School's Research Ethics Committee monitors the conduct of all research against research ethics frameworks and reports to the University Research Ethics Committee.

Both research groups benefit significantly from University-wide resources. Staff and students had access to the HIVE (Human Intelligent Virtual Environment), a multipurpose and intelligent immersion studio environment) during the early part of the assessment period. It provided an immersive environment where participants are surrounded by sounds and images on a 6m screen, and their behavioural and physiological responses can be recorded in real-time. This was amalgamated into a new Emergent Technology Centre in 2019 to be aligned with the University's interdisciplinary research agenda and contains state-of-the-art high-resolution video projection equipment and sound systems.

The Biomechanics and Physiology Research Group works across two designated physiology laboratories (one of which is wholly designated for research), a dedicated strength and conditioning laboratory, a dedicated biomechanics laboratory and access the University's general science laboratories. Access to the general science laboratories across the University during the assessment period, including biomedical, food and nutrition laboratories, has provided the group with the opportunity to extend the scope of our research activity and has offered the potential for innovative projects of a much greater scope to be pursued in the future that would not otherwise have been possible. For example, research collaborations with the Division of Health Sciences on accurate regulation of energy stores is linked to reproductive success and survival.

The Physiology laboratories have benefitted from investment during the assessment period and are fully equipped to undertake research monitoring the exercising human in various environmental conditions and exercise modes in ways that we could not conduct previously. In addition to the existing 3 Monark 891 cycle ergometers, 2 Cosmos treadmills, 1 Tanita sequential bioimpedance analyser (MC-780P), 1 Tanita DC-430 S MA and 1 Zephyr Bioharness 3, strategic investment has been made in the research environment through the purchase of 2 Monark upper body ergometers, environmental altitude tent, 2 Cortex Metalyser 3B gas analysis systems, 1 LODE Excalibur sport with integrated pedal sensors, 1 isokinetic chair and CNAP cardiac monitoring system. Other new research equipment include a smartspeed light gate system, 20 Viper GPS units for football and rugby game analysis and 2 x Gymaware linear force transducer, as well as heart rate monitors, lactate scout, lactate pro 2, hemocue for blood analysis and blood pressure cuffs.

The Strength and Conditioning Laboratory was a new, strategic investment in 2017 and is equipped with 6 Olympic lifting platforms, 6 squat racks, Olympic lifting bars and weights. This provides the UoA with greater capacity for research.

The Biomechanics Laboratory is equipped with an 8-camera VICON 3D motion analysis system, Quintic 2D motion analysis system, 4 x high-speed cameras, 2 x AMTI force platforms, 2 x Just jump mats, Megawin 8-channel EMG system, AP Capture portable telescopic sports mast system, Nacsport Scout+ Performance analysis software, Statsports Viper GPS system (plus associated software general + rugby modules) and 10 x Actigraph accelerometers. All of these were strategic investments during this assessment period and ensure more accurate research result.

The Social Science of Sport group has also benefitted from access to excellent research facilities, including psychology laboratories in the Division of Psychology and Forensic Sciences and a qualitative research lab in the Division of Sociology. These collaborations have enhanced our research environment and supported our research impact. The facilities ensure quality research is produced and allow us to expand the types of research we conduct across discipline boundaries.

The UoA has access to the £32 million-pound Dundee Regional Performance Centre which opened in 2019. The facilities include an indoor, full size 3G pitch for football and rugby, outdoor 3G combined grass pitch, indoor athletics centre with an 80m running straight, outdoor athletics track, velodrome, eight court sports hall with observation area, strength and conditioning suite

and sports science suite. There has been an interruption in the use of these facilities due to COVID-19.

The UoA's research and impact activities are supported by the University's excellent library and electronic information resources.

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

Research collaborations, networks and partnerships

Research collaborations, networks and partnerships are central features across the UoA submission as these facilitate and strengthen how we establish impact. Our approach is to identify potential stakeholders and beneficiaries of our work early on and directly involve them in the research. As illustrated in the two selected case studies, we then ensure the findings are disseminated by working directly with them and also follow-up in order to enable strong research impact.

The UoA has established research collaborations with local (Dundee United Football Club, Dundee Football Club, Fife Flyers Ice Hockey, Dundee High FP Rugby club, Dundee City Aquatics, Leisure and Culture Dundee, Carnoustie Golf Links), National (Scottish Karate, Scottish Rugby Union, Mountaineering Council for Scotland, Scottish Gymnastics, Scottish Swimming, sportscotland, Scottish Curling, Bowls Scotland, Judy Murray Foundation, Police Scotland, Diabetes Research and Wellness Foundation, Age Concern, Active Schools, Sport Northern Ireland, Switch the Play Foundation) and international (National Rugby League in Australia, Gaelic Athletic Association in Ireland) organisations.

Staff within the UoA have collaborated with 57 international HEIs during this assessment period. 48% of submitted output in REF2 are with international co-authors. This diversity of international collaboration reflects the growing research reputation of staff in the UoA.

Members of staff have honorary research appointments at the University of Canterbury (New Zealand) and University of Limerick (Ireland). These appointments have helped extend the international scope of impact activities, including the submitted impact case studies.

Members of staff contribute to the International Socio-Cultural Research Group on Women's Artistic Gymnastics and to the EU COST Network action, Transdisciplinary Solutions to Cross-Sectoral Disadvantage in Youth.

The research carried out in Brazil led to collaborations with Catalytic Communities, Comitê Popular da Copa e Olimpíadas, No Tokyo 2020, Non Paris 2024, NOlympics LA, Counter Olympic Network and a funded Carnegie Trust project.

Other collaborations across the UoA include: youth swimming (sleep/land based resistance training) accredited by Scottish Swimming; Scottish Curling; YMCA Perth; Take your Marks, Active Schools, Dundee City Council, UK Anti-Doping, UK coaching, HIIT workshops for various groups (cricket, Forfar Road Runners); Fitness testing for Hawkhill Harriers; Pre-season HIIT for Dundee football academy teams; and local golf professionals regarding golf fitness (Yoga/HIIT).

Our collaboration with industry and public sector partners has facilitated knowledge exchange and impact. Key partnerships include: Kanzen Karate, advisor for Edinburgh Biotech. The company, HIIT IT, developed high intensity exercise training programmes in the workplace based on our research.

Our collaborative research has underpinned our impact in the wider community. For example, our research has elevated the professionalism of elite sport wellbeing practitioners and enabled organisations and practitioners to generate further impacts through improved outcomes. Beneficiaries include the English Institute of Sport, National Rugby League, UK Netball Players

Association, Scotland Professional Footballers' Association, World Players Association and Switch-the-Play. The beneficiaries of our research on dropout from sport include the Gaelic Athletic Association (GAA) as an organization, 1,174 GAA clubs and the Irish mainstream education system.

Wider activities and contributions to the research base, economy and society

Contributions to the research base, economy and society by the UoA during this assessment period include the following examples below. These contribute to the UoA's approach enabling impact as they have supported the identification of potential stakeholders and beneficiaries of our research, and subsequently enhanced the vitality and sustainability of our research environment:

- representatives on journal Editorial Boards, including Sports Medicine, International Review of Sport and Exercise Psychology, International Journal of Environmental Research and Public Health, Frontiers in Psychology, International Journal of Public Health, Journal of Emerging Sports Studies, Frontiers in Sports and Active Living, Cambridge Scholars Publishing;
- reviewers for research grant funding organisations, including Diabetes UK, MS Society, Economic and Social Research Council, Medical Research Council, Carnegie Trust and European Science Foundation;
- examiners for national and international university research doctoral degrees including Kings College London, Edith Cowan University, Manchester Metropolitan University, University of the West of Scotland, Limerick Institute of Technology;
- invited research presentations at national and international conferences, including UK Coaching (December 2017), National Rugby League Conference (April 2019), Sport Ireland (September 2017), World Players Association (September 2019), Professional Association of Athlete Development Specialists (August 2018), Australian Institute of Sport (November 2020), Sports Science Summit (January 2017), EU Summit Adaptive Living and Textiles (June 2015), BASES Student Conference (2019), Physical Education, Physical Activity and Sport (December, 2020), Portuguese Society of Sport Psychology Keynote address (November 2018), Dundee Leisure and Culture (April 2019), Active Schools (January 2016), Scottish Mountaineering Council (October 2015);
- public research presentations, including Pint of Science, Dundee (May 2019);
- commissions of trust, including Leisure Studies Association (Executive Board Member, Memberships Officer), Scottish Gymnastics Board of Governance Member, Physiological Society (Historical and Archives Committee);
- hosting a British Sociological Association event in 2019, entitled *Challenging and Changing Institutional Abuses of Power*.
- the organising of the Leisure Studies Association 2019 Conference (contributing £146,668 to the local economy over 3 days) and co-organising (with the University of Dundee) the British Association for Sport and Exercise Sciences 2019 Student Conference (contributing £232,000 to the local economy over 2 days);
- actively disseminating research and impact in the media nationally and internationally, including over 110 news articles. UoA staff have also discussed their research on local, national and international radio and television stations.
- collaborating with the Switch the Play Foundation charity to establish a knowledge mobilisation platform, called Play it Forward Researchers. The platform focuses on wellbeing in sport from

the unique perspective of former athletes who have also been trained in the scientific method and subsequently conducted research about sportspeople.

- The UoA has also established an evidence-based platform, called Sport IntegriTay, that produces resources to support sport organisations to increase recruitment and retention in sport with a specific focus on supporting the Tayside region. With the support of the University's Enterprise Unit, Bell Street Ventures, resources are created to enhance sporting environments so that all participants in sport, whether they are taking part (as an athlete, coach, grassroots participant), watching (as a parent), volunteering (as an official) or working in sport do not feel unsafe or excluded for any reason, including because of their background, age, sexual orientation or ability.
- Our dissemination and public engagement activities through the Dundee Academy of Sport have made contributions to society, including the Dundee Physical Activity Strategy, Giving Children and Young People a Sporting Chance, widening access, employability, increased awareness of education, increased skills and numeracy.
- As part of the UoA's strategy to contribute to the safety and sport agenda, we have proactively contributed to society through focused collaborative research and dissemination activities related to the COVID-19 pandemic. This includes research focused on the sport of golf, and we intend to continue this research moving forward in collaboration with stakeholders.