

**Institution:** Aberystwyth University

**Unit of Assessment:** 26 (Sport and Exercise Sciences, Leisure and Tourism)

### a. Overview

Research has been a core activity of the Department of Sport and Exercise Science (DSES) since it was established in 2002. Our submission to RAE2008 was based on the research activity of 8.0 FTEs, four (50%) of whom were early career researchers (ECRs). Accordingly, our submission was characterised as that of an 'early career department', but included a research strategy that set the goal of becoming an 'established researcher' department for REF 2014, and a recognised national leader by 2020.

Since 2008, the department has continued to invest strongly in research infrastructure, staff and postgraduate students. Our submission to REF 2014 is based on 10.2 FTEs, three (30%) of whom are ECRs. Excluding ECRs, all staff have held research grants, either as lead or co-applicant, and all have supervised postgraduate research students, with a steady increase in PGR registrations and completions over the census period.

### b. Research strategy

In the 2008 Research Assessment Exercise the Department identified five strategic priorities for the period 2008-2013. Specifically, the strategic objectives in 2008 were to:

1. *continue to conduct high-quality research in the physiological, psychological and bio-mechanical aspects of sport and exercise.* Our 10.2 FTEs have collectively produced, since 2008, 105 peer-reviewed outputs, 37 of which are published in journals ranked in the top 10 of their field.
2. *develop focused research groups around existing strengths.* Two multidisciplinary groups have been established during the current census period: (1) Human Performance and (2) Physical Activity in Ageing, Rehabilitation and Health.
3. *prioritise research, both lab-based and applied, on chronic illness.* We are undertaking both lab-based and applied research in areas such as falls prevention among older people, management of diabetes, stroke rehabilitation, vitamin d and bone health, and cognitive function in dementia.
4. *increase income from research grant capture.* Although research income has increased per PI and the number of staff holding research grants has increased, there has been a small decrease in research income overall.
5. *increase numbers of research students.* Research student numbers have shown some increase, with 7 PhD completions in the Department since 2008 and a current PGR cohort of 10 (8.77 FTE), compared with 1 completion and 17 (15 FTE) on-going at submission to RAE.

We consider it reasonable to suggest that, in the period since 2008, we have successfully established the department in not only becoming an 'established researcher' department, but also in laying a strong foundation for future recognition as a national leader. To build upon this success, the overarching aim of our research strategy for the next 5 years must be to enhance research performance for outcomes that contribute to external recognition of research excellence. Our specific objectives, with linked targets, are to:

- maximise the quality of research outputs, and the number of academic staff who can be submitted in the REF, with an expectation that all staff will produce at least four outputs, the majority being at least internationally excellent in quality;
- maximise research grant income, and the number of academic staff holding grant awards,

**Environment template (REF5)**

with an expectation that research expenditure will be attributed to all staff, and that all staff will hold at least one external grant as principal investigator

- maximise the demonstrable impact of our research, with an expectation that each research group will develop at least one impact case study, and that all staff will produce an impact statement relative to their individual research activity;
- maximise the number of externally funded postgraduate research studentships, with an expectation that all staff will have supervised, either as primary or secondary supervisor, at least two research students, with at least one being externally funded.

To support enhanced research performance, our strategic priorities are to:

- optimise operational efficiency, underpinned by enabling procedures and robust performance management;
- establish a stronger, more focussed research base, and build research groups that have maximum potential to develop sustainable portfolios of excellent research;
- build strategic alliances and partnerships with other HEIs, businesses, government and non- government organisations nationally and internationally;
- enhance the translation, application and dissemination of knowledge generated by our research to the widest possible user community;
- create a sustainable, positive research environment that will attract, support and retain high quality researchers and postgraduate students worldwide;
- provide responsive strategic direction to staff that is informed by evidence-based decision-making and supported by high standards of governance.

***New and developing initiatives:*** Academic reorganisation within the University has, along with the Department of Psychology, positioned the Department within the newly formed Institute of Human Sciences. This presents many challenges to our future effective operation and, at the same time, offers much potential to support of research ambitions. There is a natural, cognate synergy between the Departments and much collaboration exists already. The operation of these two small departments will increase our capacity and ability to meet the University's requirements for research. Thus, in line with the University's new strategic plan, the department will progress towards establishing at least one research centre by 2017.

If we are to establish a sustainable research centre we must first determine the size and shape of our research portfolio, implement actions to ensure the development of research groups that can demonstrably compete on the world stage, and aggregate activity around those core research strengths that most closely align our expertise with the priorities of research funding agencies. A key driver in this context will be the formulation and emergence of new grand challenges, such as those related to the ageing population and the impact of age-related conditions among individuals and the general population.

We must also acknowledge that research excellence will offer little competitive advantage in the research marketplace of the future, since excellence is an entry criterion. Thus, whilst quality will remain important, distinctiveness will be crucial. Our rural location may offer a distinctive dimension to our future research activity, as may our activity across the continuum of research, from lab-based experimentation through to real-world application.

Ultimately, our successful research development will depend on our ability to build strategic partnerships that demonstrably enhance our capacity, performance and distinctiveness in our key areas of research. We will focus on nurturing new, emerging relationships that meet this need, including partnerships with Public Health Wales, the Public Health Improvement Network at Cardiff University, and the Centre for Public Health at Queen's University, Belfast.

### c. People, including:

The Department comprises 10, full-time academic staff (3 female), including one Professor, one Reader, two senior lecturers and six lecturers, three of whom are early career researchers. We are not only a young Department, having been founded in 2002, but also a young staff group, with a mean age of 34 years (range 25-48) and an average of 6 years (range 1-15) post-PhD award. The Department also hosts a clinician, jointly appointed with the local health board as Reader in Rural Health and Well-Being (FTE 0.2), as well as two post-doctoral research fellows (FTE 1.2).

#### i. Staffing strategy and staff development

We aspire to create a sustainable, proactive and positive research environment that will attract, support and retain high quality researchers and postgraduate students worldwide. Our goal is to enable all academic staff to be demonstrably research active, and to contribute explicitly to recognition of individual and collective research excellence. The key objectives of our staffing strategy are to:

- ensure academic appointment, probation and review procedures incorporate, as a key criterion, demonstrable capacity for producing a high-quality research profile that contributes to building capacity in areas identified as strategically important;
- provide resources strategically and flexibly to support the development of early career researchers, including our most promising PGRs, and to enable timely responsiveness to emerging opportunities;
- develop an enhanced programme of internal events that contribute to staff development, including a research seminar series, collaborative workshops and expert master classes;
- ensure research students are engaged fully with our research environment, including our internal programme of research activities and events.

Since 2008, the Department has made six academic appointments, of which four 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 through appointment of promising early career researchers (ECRs). These appointments have included lecturers in Biomechanics and Exercise Physiology and, to exploit potential commercial and CPD opportunities of our research, a Senior Lecturer (Beedie – January 2013) with senior management experience in the health and fitness industry. Crucially, we proactively identified a need for a designated Director of Research (DoR) at Professorial level (Bridle – October 2012) to develop and implement a research strategy that would produce a step change in both quantity and quality of research outputs, grant applications and research income. With expertise in clinical trials of behavioural interventions relevant to the wider public health, the appointment is well-placed to support enhanced research performance among a multi-disciplinary staff group.

The appointment of the jointly funded post of Reader in Rural Health and Well-Being (FTE 0.2) will enable an assessment of the feasibility of developing a distinctively rural dimension within our research portfolio. Research capacity has been enhanced further by two post-doctoral research fellows, both of which are joint-funded (University and Hywell Dda Health Board), signally our commitment to not only collaborative partnership working with the regional health board, but also applied health research.

The Department has particularly excelled at appointing outstanding early career researchers and supporting their career development. ECRs are supported by mentoring and encouraged to apply for small research grants (including from the university research fund, which prioritises applications from ECRs) and to contribute as co-applicants to larger grant applications led by senior staff. Since 2008, five ECRs have been co-applicant on 21 grant applications and submitted 9 as lead

applicant, with four being awarded (Davidson, Oliver and Wallace). Early- and mid-career researchers are encouraged to lead research projects and to take on leadership positions within the Department, thus acquiring experience and expertise to consolidate sustainability of the research environment.

Staff development is supported by regular research planning, monitoring and mentoring, internal peer-review of research proposals and draft outputs, and a system of wider performance review. Applications for promotion are encouraged, and the University has introduced mentoring to support candidates for senior lectureships and readerships. Since 2008, two staff have applied for, and received, internal promotions, one to senior lecturer (Thatcher) and one to reader (Hudson).

All academic staff have access to research support and professional development opportunities. These include individual research planning and monitoring meetings, internal peer review of grant applications, research leave, university conference fund, and university research fund. A departmental discretionary research fund additionally provides funding on a case-by-case basis for conference participation, research development meetings and activities to facilitate research impact, as well as external professional development courses not available at the University. In addition, staff development is supported further by allocation of both funding and time to attend up to 5 days of CPD activity per annum.

The department operates a research leave scheme for which all academic staff with 24 months service are eligible to apply for a period of up to 12 weeks leave (one academic term), subject to an appropriate research plan for the leave period. The scheme also provides for shorter periods of leave to, for example, respond to research calls that have unusually short deadlines for application submission. Since 2008, five staff have received a period of research leave, enabling the development of research grant applications, conduct of research and writing of research outputs.

Standards of research quality and integrity are detailed in the University Policy on Safeguarding Good Research Practice and the Department's Statement of Ethical Practice in Research and maintained through ethical approval procedures for research involving human subjects, internal peer review of research proposals, and research planning and monitoring meetings.

## **ii. Research students**

A key objective for the Department during the census period was to increase the number of research students. The Department awarded its first PhD in 2006, increasing to 10 by 2013, with a current cohort (2012/13) of 10 PhD (8.77 FTE) students, and rising over the period (2008/09; 6.50, 2009/10; 8.56, 2010/11; 11.26, 2011/12; 8.94). PhD studentships have been supported with funding from European Social Fund (Knowledge Exchange Skills Scholarships), the Aberystwyth University studentship competition and departmental funds, with the latter being prioritised to support ECRs. Research students have two supervisors and 7 of our current academic staff have (or are currently) supervised research students in the Department during the census period. Since 2008, 7 of 9 (78%) research students have completed within time.

Research students are encouraged to engage fully in the Department's research culture. They are responsible for organising the fortnightly research seminar series, as well as the annual key note lecture from a leading researcher in the field, thus having opportunity to develop networking skills and research contacts. Similarly, research students organised and hosted the 2010 BASES Postgraduate Conference, which was attended by over 150 delegates. In addition, research students organise and host a quarterly 'diabetes evening' attended by health and social care professionals, user group representatives and people with diabetes, providing valuable experience of research impact activities.

Research students are encouraged to participate in national and international conferences, with support available from the Department's Discretionary Fund, and to publish in appropriate journals. Since 2008, our research students have published 24 peer-reviewed papers in academic journals,

and presented over 50 papers at national and international conferences. Additional support for research students is available through the university graduate school training programme. Of the 7 PhD students completing since 2008, four have secured academic appointments at the universities of Aberystwyth (Baker; Tumilty), Sheffield Hallam (Flint) and Massey (Kuroda), two work as independent sport and exercise consultants, and one is training in Clinical Psychology (Morris).

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

**Income:** As reported in REF4b and REF4c, the department has received c. £50,000 in external research income during the assessment period, with awards being made to five staff. This represents a ~50% decrease in research income (from £100,000) on RAE 2008. This is a too simplified and unhelpful analysis, however. Much of the research income reported in 2008 is accounted for by two disproportionately large awards (totalling £68,694) received by one member of staff who has since left the Department. Removing this outlier indicates that research income in the current period has increased by approximately 60% from 2008 and, importantly, that grant capture per PI has increased by nearly 70%, rising from c. £6,000 to c. £10,000 per PI in 2008 and 2014, respectively. This is recognised in our current research strategy, which aims to increase research income both overall and per PI.

Strategies for generating grant income involve support both Departmental and University levels. Since February 2013, all staff develop, in consultation with the DoR, an individual research plan (IRP) with a 3-5 year horizon. Plans are reviewed twice yearly in monitoring meetings with the DoR and planned short-term and intermediate goals feed into the annual performance review with the HoD. DoR oversight of IRPs and staff activity aims to support development of a coherent portfolio of sustainable research among both individuals and research groups. IRPs were not in operation previously, having been implemented only after appointment of the DoR (Bridle) in October 2012.

Importantly, pilot work to support development of larger applications has been incorporated into most IRPs, representing a developmental step previously missing from staff research planning. Grants to support small-scale, pilot work are identified by the University Research Office and highlighted to relevant staff by the DoR, including, for example, internal sources such as the University Research Fund for pump-priming research of ECRs, and funding for Research Development Groups via NISCHR Research Networks. Similarly, there now exists a mandatory process of internal peer review of all grant applications in which DSES staff are lead applicants. Proactive planning of research activity and standard operating procedures for internal scrutiny are designed to support an uplift in both the quantity and quality of submitted grant applications.

**Infrastructure and facilities:** The infrastructure within the Department has been developed in two stages to permit targeted investment to support sustainability of the research environment. The second of these developments took place within the census period, and included a major building and equipment expansion. This has made the Department perhaps the best equipped facility in Wales for research in sport and exercise science.

New facilities include a gait laboratory including movable force plates, a multi-camera motion capture system and a wireless EMG telemetry system. A robot arm with tri-axial force sensors and virtual reality environment allow the study of shoulder mechanics in response to various perturbations. The gait laboratory is used primarily for the study of elderly individuals at risk of falling, whereas the robot arm is designed specifically to characterise shoulder mechanics following injury and stroke.

The physiology laboratories include five breath-by-breath gas analysers for the study of pulmonary gas exchange kinetics, six Lode ergometers, four treadmills, an environmental chamber, a Biodex dynamometer, and Digitimer muscle stimulator for the study of endurance performance and muscle fatigue. A Dual X-ray Absorptometry (DXA) scanner is used to measure body composition and bone mineral density. A biochemistry laboratory is equipped with a full suite of analysers to assay

blood, urine and sweat. These facilities include plate readers (absorbance and luminescence) used to study immune function in response to prolonged exercise, stress and nutritional interventions.

Both biomechanics and physiology research make use of LabVIEW for data acquisition and MATLAB for data processing and analysis. A number of National Instruments hardware modules allow for considerable flexibility in signal acquisition and integration. One technician is specifically trained to build virtual instruments using LabVIEW in order to exploit this potential.

All academic staff, research students and laboratories are located on the University's main campus in the purpose-built Carwyn James Building. Academic staff have personal offices, whilst research students share open-plan office space to facilitate interaction and sense of community. Where possible, final year PhD students are allocated individual office space. Technical support is provided by a team of three laboratory technicians. The senior technician supports staff in developing grants applications by providing financial cost estimates and identifying potential sources of research funding in collaboration with the University's Research Office.

Our research environment additionally benefits from access to local resources, including the University library, the adjacent National Library of Wales (a UK copyright library), and central research support services. In particular, the University invested in the establishment of a Research Office in 2010 to provide an improved support service to researchers, including grant development and application, improved research finance processes, large research-intensive project management and research monitoring. The latter has included investment of c. £130,000 in a Current Research Information System (PURE) to support research monitoring and REF.

In July 2013 the Research Office merged with the University's Enterprise Office to create the Department of Research, Business & Innovation (RBI). With a combined staff of 50, RBI works to deliver integrated and proactive research and enterprise development services whilst reducing the related administrative burden on academics. Various meetings and events are organised by the RBI to encourage interdisciplinary research (e.g. a monthly Research Café open to all PGRs, researchers and academics), and interdisciplinary workshops around funding opportunities, e.g. Leverhulme Research Programme Grants.

#### **e. Collaboration or contribution to the discipline or research base**

**Research Collaboration:** The Department is committed to collaborative and interdisciplinary research involving other HEIs, businesses, government and non-government organisations, nationally and internationally. If we are to sustain world-class research performance, we must not only nurture alliances, but do so purposefully. Specifically, our strategic objective is to develop research partnerships that can demonstrably enhance our capacity, performance and distinctiveness in key areas of research.

Within Aberystwyth University, DSES staff collaborate with researchers in the Institute of Biological, Environmental and Rural Sciences (IBERS), Computer Science and Psychology, through development of collaborative research projects, co-authored publications and joint PhD supervision. These collaborations support research on nutritional and exercise interventions related to immune function, technologies for health in rural communities, and techniques for enhancing motivation for exercise in clinical populations.

Collaboration with other universities in Wales has been enhanced by involvement in national research networks and strategic advisory boards. The Older People and Ageing Network have awarded funding (Hudson) to convene a Research Development Group for stroke rehabilitation, bringing together researchers from Swansea, Cardiff, and Bangor. Membership of the Public Health Improvement Research Network strategy board (Bridle) similarly supports interdisciplinary collaboration involving all-Wales researchers from medicine, epidemiology, health economics, psychology, social science and statistics. Our collaborations involve researchers submittable to

other units of assessment (UoA), particularly within Panel A.

Collaboration with other UK universities has been supported by Bridle's status as Principle Investigator in a number of multi-centre clinical trials co-ordinated through Warwick Clinical Trials Unit, including 'Prevention of Fall Injury Trial' (£2.4m - Exeter; Newcastle; Cambridge), Dementia and Physical Activity (£1.2m - Oxford; Reading; King's College, London), and Stretching and Strengthening Exercises for Rheumatoid Arthritis of the Hand (£950k - Southampton; Northumberland; University College, London).

Since 2011, international collaboration has been promoted by hosting three visiting fellows (Japan, Italy and New Zealand), whilst staff in the Department have visiting positions at the University of Zaragoza in Spain (Alex) and the Middle East Technical University in Ankara, Turkey (Bridle).

Collaboration with industrial and public sector partners is important both for supporting research, facilitating knowledge exchange and in developing a joint research agenda that has maximum potential for demonstrable impact. Key partnerships include 'European Aeronautical Design Service' for research involving human performance under increasing cognitive load and thermal stress, 'Broadsword' for research to enhance exercise motivation in digital gaming, and a Memorandum of Understanding with Hywell Dda Health Board to facilitate applied health research. Involvement in the Ceredigion Strategic Falls Group supports partnership with a range of third sector and voluntary organisations involved in the care of older people living in the community.

Cooperation in postgraduate training has included the involvement of public, commercial and third sector partners in co-supervision of PhD and MPhil research through the Knowledge Economy Skills Scholarships scheme. Additionally, during the census period our staff (Beedie; Bridle; Hudson) have been external supervisors for PhD students at other institutions, including Warwick, Greenwich and Leeds Metropolitan University.

**Contribution to the Discipline / Research base:** Contribution to the wider research base in Sport and Exercise Science through active participation in subject conferences, organizations and periodicals is a strategic priority in the development of the Department as a recognised national leader. Staff are encouraged to participate in major national and international conferences and to contribute to conference organisation. Since 2008, staff have delivered 6 keynote addresses at major scientific meetings, presented 30 conference papers, convened 8 plenary sessions, and both organised and hosted two conferences (e.g., BASES Student Conference 2010; International Shoulder Group Conference 2012).

Recognition of contribution to the discipline is further indicated by election of staff to prestigious positions within professional bodies, e.g. Chair of British Psychological Society Division of Sport and Exercise Psychology (Hudson) and Chair of BASES Education and Professional Development Division (Beedie). Further contribution is made by staff through commissioning of bespoke research training packages, including a 'Systematic Review Training Programme' (Bridle) delivered to staff in the centre for the 'Social Policy, Sociology and Social Research' at the 'University of Kent', Foundation Year Clinicians within the West Midlands Deanery, and Public Health Trainees at Warwick Medical School.

Contributions have also been made by staff as members of editorial boards for leading international scientific journals (including British Medical Journal, Journal of Epidemiology and Community Health, Journal of Clinical Epidemiology, Sports Medicine, Journal of Applied Physiology, and Medicine and Science in Sport and Exercise), scientific advisory bodies (Bridle - Public Health Improvement Research Network) and research funding commissioning panels (Bridle - National Institute of Health Research).