

Institution: University of Worcester

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

1. Unit context and structure, research and impact strategy

1.1 Unit context and structure

The submitting unit is located within the School of Sport & Exercise Science (SSES) which sits within the College of Business, Psychology and Sport. SSES is organised into three departments: PE & Coaching; Sport & Exercise Science; Sport Development, Management & Therapy. Its research covers the following areas: adapted physical activity, biomechanics, coaching, education and pedagogy, history, motor learning and control, nutrition, physical education, physical activity and health, physiology, psychology, sociology, sports injury and rehabilitation, and strength and conditioning. The number of staff in the submitting unit has risen from 14 (14.0 FTE) in REF 2014 to 18 (18.0 FTE) in REF 2021.

The unit has well-established Research Interest Groups in the following areas: Coaching Pedagogy and Practice; Disability High Performance Sport; Gender, Identity and the Body; Physical Activity, Health and Wellbeing; Regulation of Performance. These RIGs are built around staff expertise and provide a supportive environment for staff to develop their research activity independently and collaboratively.

The decision was taken in 2018 (as part of the academic restructure described in REF5a 1.4-5) to create larger interdisciplinary Research Groups that would create greater critical mass, draw together expertise from across Schools in a College and in some instances from different Colleges, but which would at the same time reflect the expertise in the RIGs. The following Research Groups emerged from this process and are reflected in this submission:

- Inclusive Sport & Physical Activity – led by Dr Gyozo Molnar, the group seeks to critique research and practice embedded in traditional Western-based power imbalances, to challenge inequities and inequalities, and create opportunities for participation, reflection and empowerment for marginalised, disenfranchised and excluded communities. It has two key themes: Gender Identity and the Body (led by Edwards) and Inclusive Sport (led by Richardson)
- Coaching & Performance – led by Dr Don Vinson, the group is a multidisciplinary body of researchers and practitioners seeking to aid the advancement of the human performance from a wide range of perspectives. Through collaborative research with some of the UK's most influential sporting bodies such as UK Sport, UK Coaching and The Football Association, we seek to help better understand how coaches, sport scientists and other practitioners might help athletes to learn, develop and perform to their best. The groups includes a focus on: inclusive coaching pedagogy and physical education (Vinson, Lasota, Foster); investigating pacing (A Renfree, Martin); nutritional supplements (Cook); sleep and recovery (Cook, Thomas); and developing strategies for optimal performance in hot environments (Mee, Thomas).
- Living well across the lifespan - led by Derek Peters, Professor of Sport, Health & Exercise Science, the group is designed to achieve a critical mass of inter-disciplinary academic staff with aligned research interests in areas which reflect regional, national and international research priorities in health and social care. Specific areas for priority include ageing well, physical activity for health, and living well with long-term conditions. Members are drawn from Schools of Sport and Exercise Science, Allied Health, Psychology and Business.

Overarching leadership of research in SSES falls to the Head of School (Mick Donovan). He works closely with the College Director of Research & Knowledge Exchange (who sits on the School Senior Leadership Teams for all Schools in the College) to drive forward the Research and Knowledge Exchange (RKE) agenda. The School has a research coordinator (Martin) who has operational responsibility for RKE.

SSES has an RKE Forum which brings together Head of School, College Director, Research Coordinator, Heads of Department and Research Group leads to discuss strategy and identify operational priorities for research. Strategic and operational objectives are disseminated to staff through regular School Research Away Days. Research Group leads, PhD Course Leaders from the School sit on the College-level RKE Committee, chaired by the College Director. This provides opportunity for the School to inform and influence college-level strategic and operational developments.

1.2 Research and Impact Strategy

Unit's strategic research objectives during the assessment period

The unit's REF 2014 submission identified two research areas for strategic growth: physical activity, health and wellbeing; and disability sport. To enable this growth, the unit would seek: to develop internal collaborations with colleagues in Health and develop strategic external partnerships with elite and grass-roots sports bodies, health and social care organisations, and relevant charities; and to enhance its research leadership in these areas.

These objectives were elaborated and extended in the School's Research and Knowledge Exchange Strategy (2014-19) which flowed from the institutional research strategy (REF5a 2.1). The School's overarching strategic ambition was to deliver excellent research which would make a difference to the lives of its target communities. To achieve this, it would: enhance its research culture; recruit and develop excellent researchers at all career stages; and engage with key stakeholders, user groups and communities in the design, delivery and dissemination of its research.

The unit has largely met its objectives as is evidenced through this narrative. It has expanded its research in the two identified areas, in particular, establishing a reputation in the broader area of inclusive sport. Whilst it has not made senior appointments in these areas, it has used visiting professors to enhance its leadership, has promoted staff into research leadership roles and appointed excellent ECRs (see section 2).

The unit has strengthened its research culture. The development of the RIGs and subsequent Research Groups has played a key part in this. These groups have provided a regular forum for staff to discuss their research, share ideas and develop projects. More broadly, the School runs a monthly seminar series which staff and research students use as a testing ground for conference papers. Staff can also present at the College-level seminar series.

The School actively supports external conference attendance and presentation (national and international) and has invested c.£15,000 per annum in this area. The School has also hosted a number of major research conferences over the assessment period: *British Society of Sports History* conference (Oct 2017), *European Conference of Adapted Physical Activity* (July 2018), *Cluster for Research into Coaching* conference (Sept 2019), and was due to hold in 2020 both the *Teaching Games for Understanding* conference (postponed until July 2021) and *Women in Sport and Exercise* conference (postponed until April 2021).

Impact strategy

Research in the unit ranges from basic research to research with the potential to transform policy, practice, performance and public health to applied research seeking to address specific real-world problems. The unit's applied research is normally commissioned by or developed in partnership with sports bodies, health organisations, professional bodies or charities.

The unit has adopted a number of approaches to enabling the impact of its research:

- It has developed close working relationships with colleagues in the College of Health, Life and Environmental Sciences who have well-established links with health and social

care organisations, particularly NHS trusts, and links into practice in health and social care settings.

- It has developed strategic partnerships with elite and grass-root sports bodies, notably in the area of disability sport (e.g. Football Association; British Paralympic Association; British Wheelchair Basketball), coaching networks, and with global HEIs with a particular focus on disability sport (e.g. Beijing Sports University, China; Toin University, Yokohama, Japan; University of Tsukuba, Japan).
- It created an “Impact Group” to provide support and guidance to researchers working with stakeholders and external partners throughout the research process. Early in the period the unit hosted an event to bring together research and practitioner staff to help identify individuals, external groups and organisations who might be interested in research areas and potential collaborative projects or dissemination of findings.
- It has provided training and development in developing impact which complements the University’s researcher development offer in this area.
- It has supported staff to present at practitioner conferences.
- It encourages the practice of publishing research findings in practitioner journals as well as academic journals.
- It promotes its research with the wider public through public lectures and mechanisms such as “Pint of Science” (see section 4).

The selected Impact Case Studies show many of these approaches in action:

- *ICS1 - Enhancing health provision and informing lifestyle choices for young people experiencing first episode psychosis*: the impact was underpinned by an applied research project developed in partnership with colleagues in health and a regional NHS Trust; findings from the project were widely disseminated to practitioner audiences through conferences and publications.
- *ICS2 - Enhancing elite/international disability sport performance through performance analysis research & knowledge exchange*: the underpinning research was developed in partnership with British Wheelchair Basketball; findings were widely disseminated to potential stakeholders and user groups.

Interdisciplinary Research

The University Research Strategy 2014-19 set out to develop interdisciplinary research in 4 specified Areas of Distinction (REF5a 2.1). A series of events were held in 2014/15 to identify areas of cross- and inter-disciplinary strengths within these areas. From this, emerged potential synergies around physical activity and ageing, dementia and mental health and synergies between exercise scientists and the Biomedical Research Group.

The unit received University funding to support these synergies, specifically three PhD studentships: one in the area of sport and dementia; one in the area of physical activity and healthy ageing; and one focused on physical activity and bipolar disorder.

These synergies have also led to joint projects (e.g. the SHAPE project described in ICS1) and to joint publications between sport scientists and biomedical researchers (e.g. Wadley, Alex, Holliday, Adrian, Morgan, R.G., Heesom, K.J., Aldred, S., Peters, D.M., Bueno, Allain and Coles, Steven (2018) Preliminary Evidence of Reductive Stress in Human Cytotoxic T-cells Following Exercise. *Journal of Applied Physiology*, 125 (2). pp. 586-595).

The University’s College Structure was developed as a further enabler of interdisciplinary research (REF5a 2.5). College Directors of RKE are tasked with identifying and developing interdisciplinary opportunities across Schools in a College but also between Colleges where appropriate. The Research Groups outlined above are interdisciplinary and multi-professional by design.

Open Research

The University is committed to an Open Research Environment evidenced by its resourcing of this important area (dedicated Open Access Advocacy and Support Officer; Open Access Funding) and its policy development (on Open Access and Open Data) (REF5a 2.6). This commitment is further reflected in its new Research & KE Strategy which identifies developing its Open Research environment as one of 5 underpinning principles of the strategy (REF5a 2.3.4).

The unit echoes this commitment. It has worked closely with the Open Access Advocacy and Support Officer to raise awareness of the Open Access agenda, for example, through running dedicated training events as part of School Away Days. This has fed through into a very small number of outputs (just 3) authored in the unit over the assessment period being non-compliant.

Five staff in the unit have also received funding for APCs through the University's Open Access Fund (£8,200), publishing in journals such as *PLOS One*, *Frontiers in Psychology*, *Physiology & Behaviour*, *Human Kinetics*, and *Orthopedic Journal of Sports Medicine*.

Research Integrity

At University level, the University's Research Integrity & Governance Committee has oversight of policies and procedures to support research integrity and its Chair is the University's Research Integrity Champion. The champion is expected to embed a culture of integrity across University through developing training and support for staff but also raising its profile. Peters held this role until 2018.

At College level, Research Ethics Panels are responsible for review of all staff and research student projects to ensure they are conducted according to appropriate ethical, legal and professional frameworks, obligations and standards. Panel Chairs and Vice Chairs are experienced researchers whilst panel reviewers are drawn from across the College; lay reviewers are also recruited to the panel. Molnar is the Chair of the College panel and all staff submitted in the Unit are reviewers. Training is provided to all reviewers at University level before they engage in the role. The unit has also provided specific training around ethics for all staff in the School. There is an annual audit of reviews to ensure the Panels are fulfilling their role.

Future Strategic Aims

The University's new RKE Strategy 2020-25 was approved in summer 2020 (REF5a 2.3). The expectation is that Schools' strategic objectives will flow from the University strategy but will also reflect disciplinary priorities, with Schools required to develop a strategy implementation plan accordingly. Inevitably, the Covid-19 pandemic has impacted on the development of this plan and aims set out here are consequently preliminary.

The unit's research strengths align with three of the area of challenge identified in the university's strategy:

- Physical activity, health and wellbeing with the Health and Wellbeing challenge
- Inclusive sport and physical activity with the Social Exclusion and Identity challenge
- Coaching and Performance with the Professional Education challenge

The unit will seek to strengthen these areas by:

- Strengthening its research leadership through recruitment, development and promotion
- Building research capacity through recruiting and developing excellent ECRs
- Increasing the PGR community in Research Groups through a combination of funded studentships (university and match-funded by businesses, sports bodies, etc.), fees only bursaries, and more effective "marketing" of unfunded PhD projects
- Increasing RKE funding through development of strategic approaches to RKE income generation at the level of the Research Group

- Further developing external partnerships with other HEIs (nationally and international), key sports organisations and health bodies

2. People

Staffing strategy

In line with the University's overarching strategy (REF5a 3.1.1-3), the unit's approach to recruiting staff to standard academic contracts is focused on meeting current needs of UG and PGT programmes in the School, enabling curriculum development and addressing RKE objectives at school level, in particular seeking to recruit staff whose research feeds into existing strengths and areas identified for development. In line with the unit's strategic research objectives set out above, there has been an increased emphasis on RKE in the recruitment process over the assessment period; staff recruited to standard academic contracts are normally expected to have a doctorate or to be working towards one.

There are 39 Category A eligible staff in the unit: 92% are FT, 8% PT; 97% are on open-ended/permanent contracts, 3% on fixed term; 10% of staff are ECRs, 3 of whom are returned here. 20 staff were recruited to Category A eligible contracts over the assessment period (7 of whom have since left). 11 of these had a doctorate at the point of recruitment or were nearing completion of their doctorate. Over the period, the percentage of Category A eligible staff with a doctorate in the unit has increased from 47% to 59%. It is important to note that some staff are recruited primarily for their practitioner expertise in vocational subjects such as PE, Coaching and Sports Therapy. These staff are often "second career academics" without a doctorate and limited or no research experience (see REF5a 3.1.2). The university seeks to support these staff through the "Getting Started in Research" strand of its researcher development programme (REF5a 3.2.4). These staff are important to the unit's research and impact strategy as they bring invaluable practitioner experience and have access to stakeholders and research users.

The unit has made use of Visiting Professors in the areas of disability sport (Professor Nobuku Tanada and Professor Hayley Fitzgerald) and Basketball (Professor Mindaugas Balciunas). They have actively engaged with research at the university through mentoring staff, co-publication, and collaborative projects.

Table 1 shows the balance between contract levels in the unit for both Category A Eligible and Submitted staff (see REF5a 3.1.6 for institutional comparison).

	% Category A Eligible	% Category A Submitted
Lecturer/Research Fellow (K0)	13	22
Senior Lecturer/Senior Research Fellow (J0)	46	28
Principal Lecturer/Principal Research Fellow/Head of School (I0)	38	44
Professor (F1)	3	6

Table 1: Proportion of staff by contract level

The spread of staff across contract levels varies from the institutional spread (REF5a table 1) with a notably higher proportion of staff (for both eligible and submitted) at Lecturer and Principal Lecturer with the reverse true of Senior Lecturer and Professor. This reflects the fact the unit has recruited a higher proportion of junior academics than the University as a whole (although still a low number in total) and has also promoted a number of staff to Principal Lecturer over the assessment period. A proportion of these staff have been promoted based on their research performance and there is great potential within this group for further promotion; this is important because the unit currently has a single professor and is seeking to expand its research leadership. When comparing eligible to submitted within the unit, it is noted that SLs are under-

represented in the submitted group – this reflects the higher proportion of second career academics in this group.

Staff development

At appraisal, staff with SRR are asked to present a 3-year research plan (as set out in the REF2021 Code of Practice) which as well as articulating plans for project development, dissemination and funding applications, also identifies training needs.

These training needs can often be met through the University's Researcher Development Programme which is designed to support staff at all career stages (REF5a 3.2). Staff in the unit have consistently engaged with the University's Research Leadership Programme, its Research Supervisor Development Programme, Bid Development training and Impact and Engagement training. Staff in the unit have also been active contributors to this programme.

However, the unit has offered training to complement and extend that provided in the university programme (particularly subject-specific training) and has supported staff to access external training where necessary. It also provides a weekly facilitated "shut-up and write" session for staff and research students.

Staff can also access the University's Research Mentoring Programme (REF5a 3.2.4). Nine staff in the unit have accessed the programme. They can do so at any point from appointment onwards and at any career stage. This programme has also offered an opportunity for Mentors to develop their skills, with all mentors receiving dedicated training for the role. Three staff in the unit are mentors in the programme, supporting staff across the institution.

ECRs have received active support for their development through the mechanisms outlined above but also through more informal support from senior colleagues:

- Holliday was awarded an ECR PhD Studentship in 2015, part of a University-wide initiative
- Gerrett, at that point an ECR, was supported to take a Postdoctoral Fellowship in Japan (see section 3), her role being kept open whilst she took up the fellowship
- Another staff member (Thomas) provides an excellent example of how formal and informal support has enabled staff to progress their research and their career. Appointed into a University Tutor role (teaching only) at the beginning of the assessment period, he worked closely with other researchers in the unit (both senior and ECRs) in a supporting role which enabled him to develop a publication record and transfer to a standard academic contract. As a Lecturer, he was able to access support for conference attendance and for small scale projects through the University's Vacation Research Assistantship Scheme (see below) and to further develop his publication record. Now as a Senior Lecturer he is leading his own projects.

The University was granted the HR Excellence in Research award in 2016 and is a signatory to the new Researcher Development Concordat. Staff and research students in the School have sat on the University's Concordat Implementation Group from when it was set up early in the assessment period and have thus informed the development of the institutional action plan, whilst also feeding back on its development into the School.

All staff in the unit have 20 days research and scholarly activity leave. This is complemented by individualised allocation of workloads for research based on performance and through the University's research leave scheme (REF5a 3.2.3). 7 staff in the unit have been awarded leave through this scheme (Edwards, Faull, Joyce, Kohe, Piekarz, Roberts, Vinson)

Research students

The unit has increased its PGR community over the assessment period. There are 11 current PhD students in the unit compared to 5 at the end of the REF 2014 assessment period and 8 students on its Masters by Research programme.

12 students supervised in the unit completed over the period (10.5 FTE), compared to 7 (6.5 FTE) in the previous REF period. A number of these were co-supervised by staff in other units: UoA3 (dementia and sport), UoA4 (barriers to women's participation in cycling), and UoA23 (physical education).

Recruitment to doctoral programmes is overseen by School-level PhD Course Leaders who work closely with the central Research School (REF5a 3.3.2-3). To increase its PGR numbers, the unit has taken a three-pronged approach:

- It has increased its supervisory capacity. 17 staff in the unit are on the University's Register of Approved Supervisors.
- It has been successful in winning University-funded PhD studentships. It has been awarded 7 fully funded PhD studentships in the assessment period, one match-funded by British Wheelchair Basketball and one PT Fees only Studentship.
- It has focused on growing numbers within its Research Groups.

PhD Course Leaders also play a core role in oversight of research student progress. They sit on the University's Research Degree Board and are responsible for annual monitoring of student progress within the School.

Schools work closely with the Research School to ensure that research students are embedded within both the subject and wider research culture:

- Research students are attached as affiliate members to one or more Research Groups.
- They are encouraged to attend and to present at College-level research seminars.
- A school-level Research Student representative sits on the College RKE Committee.

Research students in the Unit are required to engage with the central Research Student Development Programme (REF5a 3.3.4). The programme has been mapped against Vitae's Researcher Development Framework. The programme offers a suite of modules, short courses and workshops, delivered face-to-face or online, some of which are compulsory for all doctoral students, focused on the following core areas: planning and managing research; academic writing; research methods; data analysis; research integrity and ethics; dissemination, engagement and impact; careers and employability. The University also supports students to engage with external training where this is specialist and not available through the University's programmes. Students are also able to access training offered through the GuildHE Research network. As part of the programme, students may also engage with Level-7 subject specific methods modules.

Beyond the programme, the Research School offers additional development opportunities. Research Students have opportunities to teach, particularly those on a PhD studentship and can access modules and workshops to develop their skills in this area, with the opportunity to gain associate or full fellowship of the Higher Education Academy. The University offers research student-specific dissemination opportunities including an annual "Images of Research" exhibition and student-led PGR Conference. Further, the University provides funding opportunities for students to attend and speak at external conferences and events and separate funds to support students to develop inter- and cross-disciplinary networks, seminar series, conferences and events. The University is also a member of the Brilliant Club, a charity focused on improving access to University, which provides opportunities for doctoral students to go into schools and deliver tutorials in their area of expertise. The Research School also provides more ad hoc opportunities: for example, in 2019 the lead for the development programme worked with a student team to deliver a University programme for Pint of Science.

All supervisors are required to complete the University's Research Supervisor Development Programme (REF5a 3.3.8-9). The programme has been in place for some 20 years but was rethought and relaunched in 2018/19. The programme offers a wide range of support for supervisors at various career stages on themes such as: introduction to supervision, supervisory styles, regulations and processes, supervising international students, PGR mental health and wellbeing, supporting student progress. New supervisors must complete the whole programme but more experienced supervisors must also engage with core elements and all supervisors are required to engage in regular refresher training (every 3 years). The programme is complemented by supervisor lunches that bring together supervisors to discuss key topics and challenges in supervision. The programme is aligned with UKCGE's Good Supervisory Practice Framework. Staff are supported to apply for the UKCGE Supervisor Recognition scheme and Molnar was the first supervisor in the university to gain this recognition.

Equality and Diversity

The University has a fundamental commitment to equality and diversity (REF5a 3.4). It seeks to consider and apply equality and diversity principles in all that it does, from recruitment and selection, to appraisal and promotion, to staff development to flexible working and support for health and wellbeing. Its policies and processes are designed to disadvantage no-one and are subject to ongoing equality impact assessment to ensure this is the case.

The unit's approach flows from this, with the Head of School ensuring that the University's principles and policies are fully enacted.

- Recruitment of staff follows the institutional process, which require all those involved in the selection process to have undertaken equality training.
- Internal recruitment to positions of research responsibility, such as research coordinator, PhD course leaders, Research Group lead also follow a formal application process to ensure equality of treatment.
- Line managers are sure staff are aware of and are supported to engage with, for example, the University's flexible working policy, its parental leave policies, its policies which support carers (such as its Critical Illness Policy) and its staff wellbeing initiatives (see REF5a 3.1.8).
 - Several staff in the unit have benefitted from the University's flexible working policy (REF5a 3.1.8), being able to change their working patten over time (e.g. one staff member has moved from part time to full time).
 - Staff in the unit have taken parental leave in the assessment period. They have received active support to transition back to work after the leave period, through "keeping-in-touch" days, phased return, mentoring. It is ensured that where a staff member takes parental leave this does not impact on research leadership or supervisory roles.

The unit is committed to the wellbeing of its staff and research students. To support this, both staff and research students have access to the university-wide mental health and well-being support, including (for research students) access to the support offered by the disability service, the counselling and mental health teams, and (for staff) the Employee Assistance Programme which provides counselling and 24 hour support.

Staff in the unit are committed to equality and diversity. Staff in the unit were members of the University's Athena SWAN self-assessment team; the University received its institutional Bronze Award in April 2018 and is committed to making departmental applications in the next 2 years. Staff are also engaged with various staff networks focused on protected characteristics and with the LGBTQ+ Allies scheme.

In preparing this narrative, it was recognised that there are opportunities to enhance practice at unit-level. There has been no equality impact assessment of local funding processes (e.g. support for conference attendance) and, whilst there is no suggestion that any group is disadvantaged, this is a clear area for development.

3. Income, infrastructure and facilities

Income

The unit has sought to increase its external funding over the assessment period from its REF 2014 levels. Research Groups are expected to develop their own strategies for RKE income generation. They have been supported in this by the central Research Office and primarily, since the academic restructure, by a College Director of RKE and RKE Facilitator. The Director's role is to provide leadership and guidance for Research Groups in developing their strategy, whilst the Facilitator works with Research Group leads to develop a bespoke funding opportunities service for members. Staff have also accessed training, general and bespoke, on bid development provided by the Research Office.

It has had moderate success in winning funding, slightly increasing its average annual income from REF 2014 levels (£20,043 compared to £18,975). It is recognised that RKE income generation is a significant area for development going forward and is highlighted as a key strategic objective.

The unit received funding from a variety of sources: NIHR Research for Patient Benefit, ESRC, British Academy, Erasmus+, Japan Society for Promotion of Science (JSPS), sports and coaching organisations.

Examples of funded projects include:

- Gerrett (PI), The influence of repeated metabolite accumulation on the control of regional sweat gland output during hyperthermia, JSPS Short Term Postdoctoral Fellowship (2014-15)
- Vinson (PI), Investigating the culture of coach education structures in the UK: Implications for the development of under-represented groups, Sports Coach UK (2014-15)
- Artz (Co-I), Effectiveness and cost-effectiveness of outpatient physiotherapy after knee replacement: A randomised controlled trial, NIHR RfPB, (2015-18), led by University of Bristol with University of Plymouth, University Hospitals Bristol NHS Foundation Trust, North Bristol NHS Trust.
- V Jones (PI), G Renfree (Co-I), [Gender Equality Toolkit for Generation Z \(GETZ\)](#), Erasmus+ (2017-2020) with Amsterdam University of Applied Sciences, Netherlands; Molde University College, Norway; Vrije Universiteit Brussel, Belgium; Swedish Sports Confederation, Sweden; European University Sports Association, Slovenia; Croatian Olympic Committee.
- Molnar (PI), Broadening Perspectives in Adapted Physical Activity Research, British Academy Small Grants, (2018-19)
- Faull (Co-I), [Paralegacy 2020](#): Building Japanese research capacity around disability studies and sport to positively impact the lives of people with disabilities, ESRC-AHRC UK-Japan SSH Connections Grant (2018-20), led by Coventry University with University of the West of Scotland, University of Kent, Juntendo University, Nippon Foundation Paralympic Support Centre, Co-Innovation Laboratory, Tokyo, Hokkaido College of Medicine and Sports.

These successes highlight the increasingly strong focus in the unit on inclusive sport.

Infrastructure

The University has significantly expanded its institutional infrastructure for supporting research and impact over the assessment period, establishing a RKE Directorate consisting of a Research Office, Research School and College RKE infrastructure (REF5a 4.1). It has also expanded support for researchers offered by Library Services.

Its RKE Directorate provides wide-ranging support and guidance for researchers around identifying funding (including access to funding databases, such as *Research Professional*), bid development, KE and impact generation (including use of *Vertigo Ventures Impact Tracker*), project delivery (including contract negotiation, liaison with partners, financial and other reporting) and research governance (including data management, data sharing, protecting and exploiting IP). It also provides access for researchers to a current research information system (PURE).

Library Services maintains a publication repository (WRAP – Worcester Research and Publications) and provides access to major citation databases (Scopus and Web of Science), as well as subject-specific databases such as Human Kinetics. Library services also offers support and guidance around Open Access and data management, archiving and sharing.

The University offers a range of research support schemes designed to support researchers at all career stages and, variously, to pump prime projects, develop international collaborations, advance existing areas of work (REF5a 4.1.6). Staff in the unit have been successful in gaining funding from these schemes: 7 fully funded PhD studentship, one match-funded PhD studentship with British Wheelchair Basketball and one PT fees-only studentship; 24 Vacation Research Assistantships (VRAs).

The studentships were in the areas of: performance analysis and wheelchair basketball, 2013-17 (Peters); women, HIIT and weight loss, 2015-19 (Holliday and Peters); Olympic legacy (Kohe and Molnar); dementia and the power of sport to maintain identify, 2016-20 (Kohe and Dawn Brooker, Professor of Dementia Studies); physical activity, sedentary behaviour and mood in Bipolar Disorder, 2016-20 (Peters and Lisa Jones, Professor of Psychological Medicine); sociology of angling, 2017-21 (Molnar); basketball heritage in the UK, 2017-21 (Molnar and Kohe); women, ageing and physical activity, 2018-22 (Rhoden and Dr Alison Blank, SL in Occupational Therapy); coach decision-making, 2018-22 (Vinson). Four of the students appointed to these studentships have completed in the assessment period with all having published papers from their thesis and one leading to an impact case study.

VRAs awarded in the period have enabled staff to develop projects, to establish and enhance cross-university collaborations and to publish. Some examples:

- Kohe's 2014 VRA on the legacy of the Olympic/Paralympics led to the subsequent funded PhD studentship in this area
- Gerrett's 2015 VRA on pre-cooling for intermittent activity in the heat on which she worked with Thomas, led to publication: Thomas, G. , Cullen, T., Davies, M., Hetherington, C., Duncan, B. and Gerrett, N. (2019) Independent or Simultaneous Lowering of Core and Skin Temperature Has no Impact on Self-paced Intermittent Running Performance in Hot Conditions. *European Journal of Applied Physiology*, 119 (8). pp. 1841-1853.
- A collaborative pilot project between the unit and the Biomedical Research Group at Worcester focused on characterisation of immune cell phenotype and function in response to moderate and high intensity exercise ultimately led to the following publication: Wadley, A., Cullen, T., Vautrinot, J., Keane, G., Bishop, N. and Coles, S. (2020) High intensity interval exercise increases the frequency of peripheral PD-1+ CD8+ central memory T-cells and soluble PD-L1 in humans. *Brain Behaviour and Immunity: Health*, 3. Article no. 100049.

Research support funding is also offered at School-level: for conference attendance (as noted in section 1); publication costs (e.g. extra page payments); and to support ongoing projects with direct research costs (e.g. transcribing, consumables).

Facilities

The Hive, the joint University and Public library (REF5a 4.2.2), provides a significant space for researchers to disseminate their research to the public, through public lectures, and other

events. Staff and research students in the unit have delivered public lectures (e.g. Peters) and contributed to the University's annual *Images of Research* exhibition.

The Library also hosts the National Basketball Heritage Archive and Studies Centre. This archive is the heritage partner for an AHRC Collaborative Doctoral Studentship with UCLAN. It is also the primary source for a Fees Only PhD studentship awarded to the unit.

The University Arena is a sports arena with the design to support wheelchair sports and the capacity to host major sporting events. It hosted the 2015 European Wheelchair Basketball Championships and is home to a British Basketball League team and Netball Superleague team. It thus provides first class facilities to support research relating to performance analysis of basketball, netball and disability sport during national and international tournaments.

Researchers in the submitting unit have access to high quality research facilities. The Motion and Performance Centre (MPC) provides a facility for 3D motion capture and gait analysis. MPC is supported by two full-time engineers who provide specialist support for equipment, and data collection, processing and analysis. Provision for sports performance research includes two further laboratories supported by a specialist technician. Two performance analysis suites with extensive video camera and tripod equipment and specialist software have been further developed over the period, whilst successful bids to the University's capital bids scheme have funded specialist equipment for specific research, for example: equipment for analysis of blood.

The University's McClelland Centre for Health and Well-Being provides therapy and fitness testing rooms which staff are able to utilise for research. Researchers from the submitting unit also have access to an environmental test chamber capable of recreating most climate types and environmental conditions worldwide, and the Biomedical laboratories which form part of the Darwin Building science facilities.

The unit provides well-equipped specialist facilities to support its research. Laboratories in SSES and SSE make full use of the Universities annual capital bids to purchase new equipment to support research. Specialist technical staff support research activity across the unit through maintenance and calibration of equipment and sourcing of new equipment.

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

Collaboration

Staff in the unit have engaged in collaborative research with other HEIs, both nationally and internationally, and a range of non-academic organisations.

National collaborations include: Bangor, Birmingham, Brighton, Bristol, Brunel, Chichester, Coventry, Hartpury Leeds Beckett, Liverpool John Moores, Loughborough, Stirling, Swansea.

International collaborations include: Alabama (USA), Auckland University of Technology (New Zealand), Agder (Norway), Beijing Sports University (China), Illinois (USA), Molde University College (Norway), Southern Denmark (Denmark), South Pacific (Fiji), Sunshine Coast (Australia), Vrije Universiteit Brussel (Belgium).

Collaboration with other organisations: British Wheelchair Basketball, County Sports Partnership Hereford and Worcester, Football Association, Herefordshire and Worcestershire Fire and Rescue Service, The Lakeshore Foundation, Multiple Sclerosis Society, Shropshire Fire and Rescue Service, West Bromwich Albion FC, Worcestershire NHS Health and Care Trust.

Contribution to the research base

Staff have held the following positions in learned societies and relevant professional bodies: BASES Policy Review Task Group (2016-17), Executive Committee of International Society of

Performance Analysis of Sport (2016-18), World Obesity Forum Corporate Relations Strategy Advisory Group (2014-15), Treasurer of the International Society of Performance Analysis of Sport (2012-16).

Staff in the unit have delivered keynote and invited presentations at: Politics in the Olympics, Winter Olympics Workshop, France 2018, (Molnar); Effects of exercise on cognitive, perceptual and motor performance research seminar, Coventry UK (Joyce)

Staff have been on the organising committee for national and international conferences: 7th International Teaching Games for Understanding Conference, University of Worcester, 2020; 7th International Society of Performance Analysis of Sport International Workshop, London Sport Institute, Middlesex University, 2017; World Congress of Performance Analysis of Sport XI, Alicante, Spain, 2016; International Society of Performance Analysis of Sport 6th International Workshop, ITC, Carlow Ireland, 2016; World Congress of Performance Analysis of Sport X, Croatia, 2014; International Society of Performance Analysis of Sport Workshop, Bredbury Hall Hotel, Manchester, 2014; EUCAPA, University of Worcester, 2018;

Staff sit on external research committees, boards, advisory groups: Men and Boys Coalition, Male Psychology Network (Edwards); EIS Tokyo Heat Preparation Advisory Panel 2018-19 (Mee); Member of the All-Party Parliamentary Group on a Fit & Healthy Childhood (2014-); Women in Sport & Exercise Academic Network (G Renfree).

Staff have acted as peer reviewers for the following UK and international research funders: Dunhill Medical Trust, Economic & Social Research Council (ESRC), LEaDing Fellows Post-Doc Programme, Leverhulme Trust, Medical Research Council (MRC), Netherlands Organisation for Scientific Research (NWO), Physiological Society.

14 staff have acted as reviewers for a range of journals in Sports Science, Sports Coaching, Sport Sociology, Psychology, Nutrition and Education & Technology (Disability & Rehabilitation, Disability & Society, Adapted Physical Activity Quarterly, Psychology of Sport & Exercise, Body Image, Journal of Eating Disorders, Journal of Sport Sciences, The Sport Psychologist, Medicine and Science in Sport and Exercise, Sports Medicine, Frontiers in Exercise Physiology, International Journal of Sport Science & Coaching, Sport, Education & Society, Ethnography, Sport in Society, Journal of Contemporary European Research, Sociology of Sport Journal, International Journal of Performance Analysis, Qualitative Research in Sport, Exercise & Health, European Journal of Sport Sciences, Applied Physiology, Nutrition & Metabolism, Perceptual and Motor Skills, Nutrients (MDPI), Journal of Thermal Biology, Applied Physiology, Nutrition & Metabolism, Temperature) reflecting the diverse expertise in the unit.

Staff have held editorial roles for the following journals/publishers: Frontiers in Exercise Physiology, MDPI Psychology Journal, Graduate Journal of Sport, Exercise and Physical Education, Sport in Society, Asia Pacific Journal of Sport & Social Science.

Staff have received the following recognition and awards: Fellow of the British Association of Sport Sciences (Peters); Fellow of the European College of Sport Science (Peters); Young Investigator Award, American Journal of Physiology – Regulatory, Integrated, and Comparative Physiology, 2016 (Mee); Best presentation, Electronic Visualisation and the Arts conference, 2016 (Golz); Best presentation, World Academy of Science, Copenhagen, 2017 (Molnar).

Staff have contributed to external research degree programmes: through external supervision of research students at Bangor (Mee), Gloucestershire (Vinson), Wolverhampton (Rhoden) and University of the Basque Country (A Renfree); through external examining at Cardiff Met (Peters), Leeds Beckett (Vinson), Australian Catholic University (Peters) Canberra (A Renfree), Cape Town (A Renfree), Limerick (Vinson), Murcia, Spain (Vinson) and Otago, New Zealand (Molnar); and research degree validation panel at the University of Sunderland (Foster).

Contribution to Economy & Society

Staff in the unit are continuing to make significant contributions to economy and society beyond that described in the unit's ICS. Examples of this are:

- Rhoden and Joyce have engaged with community groups to develop research ideas and recruit participants for projects. In 2018 and 2019 they hosted an Active Ageing week in association with the International Council on Active Ageing, Sports Partnership Herefordshire and Worcestershire and u3a to promote active ageing through a diverse programme of public talks, interactive workshops and physical activity taster sessions led and underpinned by our research in dementia, nutrition, and self-efficacy. Rhoden has written a joint research application with clinicians from Integrated Care for Older People (Worcester) and has co-developed a project for exercise in care homes and the provision of physical activity taster sessions in collaboration with Public Health Worcester and Worcester Association of Carers.
- Vinson and Cale have utilised their research and practice in coaching to set up a Grassroots coaching conference and National Coach Mentor development days for the Football Association.
- Golz, bringing his expertise and research in dance and digital, has choreographed a series of three ballets for Brighton Digital Festival funded by Arts Council, England and Google (RISE award) which have subsequently been performed at the Royal Institution, the V&A and Amex Arena.
- Edwards' research on body image and masculinity has supported the work of artist Steve Wilson (Meadow Arts) with a public show 'The Man in the Middle' at NT Croome in May 2019.
- Harding has worked with researchers in Dementia Studies on a project on sporting memories collaborating with West Bromwich Albion FC and Wolverhampton Wanderers FC and practitioners from Edward Street Hospital to develop a Memories Group supporting football fans with dementia.
- A Renfree has delivered a series of webinars for England Athletics in 2020 based on his pacing and decision-making research.

Staff in the unit have contributed to public engagement activities, such as: Images of Research (2014-2019) and Pint of Science (2018). They have also presented their research at public events at the Hive.