

**Institution: University of Chichester**

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

## **1. Unit context and structure, research and impact strategy**

### **Overview**

Researchers in this unit sit within the cross-disciplinary Chichester Institute of Sport (CloS). The overarching ethos of the Institute is to give academics the freedom to pursue a wide range of research activity (from interest-led to fully funded, from proof of concept to applied application) within an environment that is collaborative, equitable and sufficiently agile to respond to new trends and the needs of research commissioners.

Over this REF cycle, we have seen significant growth in the quality, quantity and diversity of our research outputs and impacts. This has been driven, and sustained by, a sea change in our research environment produced by strategic investment in selected activities, merging of existing departments into a larger unit and by the provision of tailored developmental opportunities for staff aspiring to develop as researchers. This is evidenced in many ways, most notably:

- **943% increase in research income since REF2014 (from GBP584,000 to GBP5,590,000)**
- **329% rise in post-doctoral researcher and research assistant numbers (REF2014: 7; REF2021: 23)**
- **Quadrupling of faculty professoriate from 1 to 4 since REF2014.**
- **Growth in registered postgraduate research students (from 17 to 27)**
- **245% increase in Web of Science indexed articles published over the census period (2014: 101; 2021: 247) without an equivalent increase in staff FTE.**
- **98% of REF submitted publications in Q1 or Q2 journals (87% in Q1; REF2014: 70% Q1, 82% Q1-2).**
- **94% growth in PGR students registering.**

### **Unit context and structure**

The University of Chichester (UoC) has a proven track-record of producing high quality, impactful, applied research within the fields of sport and exercise science and sport sociology. This is reflected in previous REF submissions (REF2014: 19 FTE with 55% of submission rated 3/4\* and 100% of impact at 3 or 4\*). We have improved our rating in each assessment exercise since RAE 1996 (3b rating). Staff submitted to the Sport UoA have, historically, been drawn from the Departments of Sport and Exercise Science (DSES); Sport Development and Management (SDM); and Physical Education (PE) and Adventure Education (AE), although the majority of submitted staff have been faculty members of DSES.

In 2018, the above departments merged to form the CloS (Director: **Lauder**). This strategic merger has enhanced the vibrancy and sustainability of our research environment. The numbers of researchers within each of our research themes have increased, stimulating new areas of research (e.g. Adventure Sport Coaching), and fostering increased cross-disciplinary collaboration (e.g. the use of supplementation in climbing). The CloS includes 62 members of staff (56.35FTE). Of these, 29 (28.15FTE) have significant responsibility for research (SRR) and 20 (16.5FTE) are on a career trajectory that is working towards it. Of those with SRR, 11 are Readers (6) or Professors (5), 5 are ECRs, and 4 have been submitted to other units of assessment (e.g. Units 23 and 33). There are currently 9 full-time contract researchers (6 Post-doctoral researchers (Research Fellows) and 3 Research Assistants). Of the post-doctoral researchers submitted to this Unit, 4 have SRR.

We enhance our research environment with a cohort of visiting professors and fellows who provide academic expertise in a range of areas and with a range of responsibilities. Currently, we have 3

visiting fellows and 2 emeritus professors. Over the course of the REF cycle, we have hosted a further 3 visiting professors and 2 fellows. Their remit is to mentor identified staff members and engage in collaborative research.

The researchers of CloS are coalesced around 6 broad, interlinked themes. To increase interdisciplinary thinking and collaboration, researchers, including PGR students, may contribute to multiple themes. These are:

*NB. Throughout this document, emboldened surnames indicate staff submitted to this Unit, italicized names indicate former staff, underlined names indicate staff submitted to other units. All other surnames refer to non-submitted staff within CloS.*

**Occupational Performance:** (Current members: **Ashdown, Blacker, Datson, Greenlees, Hale, Lake, Maroni, Myers, Rue, Siddall, J.Smith, Willems**, Light, Needham-Beck, Powell, Walker). Researchers in this theme, through the Occupational Performance Research Group (OPRG; Leads: **Myers** and **Blacker**), deliver multi-disciplinary research and consultancy to enhance the selection, performance and health of personnel working within physically demanding occupations (e.g. the military). The OPRG includes 6 Research Fellows and 1 RA, with contributions being made by a range of other staff members where specific expertise is required. In the past five years, the OPRG has won over GBP4,000,000 of research contracts working with a range of clients. 7 PGRs align with this theme.

**Enhancing Sport Performance:** (Current members: **Blacker, Day, Figgins, Gault, Greenlees, Hale, Hodgson, Hudson, Lake, Lauder, Maroni, Myers, J.Smith, M.Smith, N.Smith, Willems**, Berry, Birch, Bird, Bright, Christian, Crisp, Eldridge, Graham, Light, Lomax, Perkins, Pulling, West). This theme delivers research and consultancy to sporting organisations aimed at enhancing the performance, development and well-being of coaches and athletes. Research is inherently multi-disciplinary with expertise in sport psychology, exercise physiology, sports biomechanics, performance analysis, nutrition, strength and conditioning, physiotherapy and skill acquisition. 10 PGRs align with this theme.

**Health and Well-Being:** (Current staff: **Ashdown, Blacker, Day, Edmunds, Figgins, Hale, Hudson, Potter, Lauder, Matthews, Myers, Siddall, J.Smith, M.Smith, N.Smith, Willems, Yu**, Berry, Cessford, Davis, Everley, Kelly, Hogh, Lawie, Perkins, Sims, Spurr, Warke). This theme explores the benefits of sport, exercise and physical activity and how to promote these activities. Research interests include increasing physical activity in: school and workplace settings; amongst individuals with heart problems, rheumatoid arthritis and morbid obesity; amongst amputees. In addition, research has also explored the physical and psychological benefits of non-sporting physical activity, such as drumming. Two recent, EU Interreg funded collaborative projects explore the impact of Men's Sheds on health and social participation behaviours (SBS) and sexual health and wellbeing in the over 45s (SHIFT). Each project has secured over EUR2,000,000 funding. This theme is supported by 2 externally funded Ras. 6 PGRs align with this theme.

**Nutritional Supplementation:** (Current members: **Blacker, Gault, Hodgson, Myers, Potter, Willems**, Perkins, Spurr, West). Research in this theme examines the physical and cognitive benefits of nutritional strategies and supplements. A focus of recent research, led by **Willems**, has been the effects of polyphenol supplementation on health and physical performance. Researchers (**Blacker, Myers**) have also explored the use of supplementation in military personnel. 5 PGRs align with this theme.

**Diversity and Equality in Sport:** (Current Members: **Day, Datson, Figgins, Greenlees, Matthews**, Crisp, Goosen, Everley, Kelly, Lawie). This theme is concerned with how inclusivity and diversity can be achieved in and through sport, with a key focus on Women in Sport, specifically the history and development of women in sports leadership roles. This theme has, recently, expanded to include research examining safeguarding of children, community and disability sports. Bolstering this theme, CloS hosts an international network of figures and

researchers, The Anita White Foundation. Professor *Elizabeth Pike* is a visiting professor who contributes to the research activities in this field. 2 PGRs align with this theme.

**Optimizing Practice in Physical Education: (Current members: Gault, Lauder, Potter, Berry, Christian, Eldridge, Everley, Gwynn, Goosen, Lomax, Mantle, McKinney, Mills, Perkins, Sims, Spurr).** Researchers in this nascent theme deliver research and consultancy on teaching methods and behaviours that optimise learning in PE. Research conducted is multi-disciplinary with expertise in pedagogical practice at primary and secondary levels; evaluating the impact of ITT programmes; inclusion; reflective practice; teaching behaviours and the role of schools in children's health. 3 PGRs align with this theme.

Themes are further supported by a Research Methods and Statistics team of 3 (**Hale, Hough** (submitted in Unit 4), Graham).

### **Research Governance**

The unit's research is led by a designated Research Lead (**Greenlees**, time allocation: 0.2 FTE) who provides an oversight of the CloS's research and promotes engagement with researcher development, open research and issues of research integrity. The Research Lead is a member of the CloS's Strategic Leadership Team and Institute Management Group (both chaired by **Lauder**) and so directly contributes to operational planning via these groups. Research decisions are discussed, agreed and disseminated via these two groups. There is also a CloS Research Group (chair: **Greenlees**). This group consists of Readers and Professors and designated representatives from all areas of the CloS and includes contract researcher and PGR student representation. This group's remit is to develop initiatives to enhance the research environment within the CloS. Through all of the groups outlined above, information concerning researcher development, open access requirements and research integrity are disseminated throughout the Institute. **Greenlees** also sits on University-wide research focused committees.

### **Research and impact strategy**

The research mission of the CloS *is to be internationally recognised as an institute producing world class, impactful research that is inspired, accessed and used by academic and industry audiences alike.*

In 2013, in preparation for REF2014, the DSES began to develop priorities for future research activities, and to implement actions to achieve these. In 2015, following the outcomes of REF2014, a series of research priorities were identified (later adopted by the CloS). These were:

- Focus support for existing areas of excellence or areas with clear potential for excellence.
- Develop a vibrant and visible research environment that facilitates the career development of researchers at all career stages.
- Engage more fully with “end-users” of our research to drive research activities and to harness potential research impact.

### **Focused support for activity in existing areas of research excellence**

By 2015, the Unit had identified a number of areas of existing or potential research excellence (Occupational Performance, Health and Well-Being, Women in Sport, Nutritional Supplementation, Applied Sport Science and Coach Development) that were also well placed to provide pathways to impact and funding opportunities. Following internal reviews and discussions with industry colleagues, we decided to focus first upon Occupational Performance and to use this opportunity to build resources and expertise to develop other areas.

In September 2013 we appointed **Blacker** from industry to further develop the DSES' occupational performance expertise. In 2014, the Occupational Performance Research Group (OPRG), was convened by **Blacker, Myers** and *Wilkinson*. The remit of this group was to develop

this research area using existing staff expertise and external collaborations. In 2015, we realigned *Wilkinson's* job role (previously Sport Science Support Officer) to focus on OPRG activities. We also realigned the research time of **Blacker and Myers** to focus on developing research and bidding for external funds. Additionally, in 2016, we appointed a CloS Projects Support Coordinator to assist the group (and other CloS members) develop and submit bids. From 2017, further investment in this group has been provided through (a) promoting **Myers** (Chair) and **Blacker** (Readership) to increase their research time, (b) employing Research Fellows and Research Assistants to support the delivery of externally funded work, (c) funding 6 PhD studentships, (d) establishing a biochemistry laboratory to support the work of the group and to allow the pursuit of fundamental and applied research projects and (e) supporting the appointment of **Blacker and Myers** on a NATO panel.

We have, as intended, used the success of the OPRG to develop other areas. In addition to OPRG funding freeing resources for other research themes, OPRG research fellows have also been appointed on the basis of their ability to contribute to other research themes in the Unit (or in other units) and/or their research knowledge and experience. For example, Needham-Beck was appointed with a view to supporting the emergence of Dance Science at the University, and *Coakley* was appointed to contribute to the development of statistical advice within the Institute.

The Women in Sport area was also strategically expanded to capitalize on existing expertise. First, the research time of *Pike* was focused on developing this area. In late 2013, **Matthews** was appointed to the role of Research Officer to support research activity. In 2015, **Matthews** was appointed SL and UoC strategically invested in 2 full-time PhD students to build critical mass in the area. In 2019, *Piggott* was appointed Research Officer to expand research and public engagement activities of the group. The development of the Women in Sport research activity (and the Developing Coaches, Athletes and Teachers theme) was further supported through the University's successful 2017 application to become, and invest resources into, one of the Football Association's Women's High Performance Football Centres. This initiative provides greater access to, and links with, high performance football players, coaches and administrators in the Women's game. The success of this support is evidenced through the award of over GBP30,000 of Football Association funding to research standards of refereeing (**Datson**, Everley, **Figgins**, **Greenlees**).

Since 2015, the University has invested in research through the strategic promotion of researchers. These were:

- Occupational Performance and Nutritional Supplementation: **Blacker** (Reader) and **Myers** (Chair).
- Enhancing Sport Performance: **Lake** and *Callan* (Readers), **Lauder** and **Greenlees** (Chairs).
- Equality and Diversity in Sport: Everley (Reader) and *Pike* (Chair).
- Optimizing Practice in Physical Education: Everley (Reader)
- Health and Well-Being: *Lowry* and **Day** (Readers)
- **Hale** (Chair) to provide additional research methods support across the University.

We have also invested in the themes through the recruitment of CloS-funded PhD students to projects aligned to themes (see next section).

### **Develop a vibrant and visible research environment.**

The CloS's research environment has been developed through regular contact and communication within the Institute. We hold weekly (semester-time) research seminars delivered by internal and external speakers that are open to all staff and PG students. These sessions include workshops on the research process, such as specific research methods, funding, and impact designed to enhance the skills base across the Institute. We also host an annual, one-day Early Career Researcher Conference that is open to all members of staff but is particularly

aimed at those without SRR and PG students. The meeting includes a range of presentations and development sessions.

The research environment has also been augmented through the 2015 and 2017 promotions of readers and professors. One responsibility of these role holders is to mentor and advise other members of staff. In 2015, we selected a series of “Research Champions” (Public Engagement (**M.Smith**); Research Funding (**Myers**); Researcher Development (**Day**) and Research Impact (**Willems and Blacker**), whose role is to provide colleagues with advice and notice of opportunities in these areas. This, coupled with the increased numbers of readers and professors, has contributed to a greater range of research leaders within the Unit.

In 2015, we renewed Professor Terry McMorris’ role of emeritus professor to mentor selected members of staff (e.g., **Hodgson, Myers, Hale, N.Smith**) and to provide general advice on the research process across the IOS.

In 2016, we introduced a competitive research fund that is designed to support research in a number of ways, from pump-priming new research and grant applications to supporting research extensions to enhance the impact and quality of existing research programmes. Since 2016 we have supported over 30 projects in this manner.

We have also enhanced the research environment through an expansion of our PGR cohort. Since the last REF exercise, we have nearly doubled the number of PGR students registered (from 17 in 2013 to 27 currently). Since 2017, the CloS has funded 13 full-time PhD students. This has been achieved through application for University funds (2 students), direct funding (4 students), through strategic reinvestment of externally funded contract research to support a parallel programme of PhD research, and an on-going agreement with the RYA/EIS (1 student). Funding for further studentships is written into the CloS organisational plan. We have also recruited part-time students through the strategic use of fee-waivers and through applicants’ desiring to work with CloS researchers.

Our success in developing a vibrant research environment is evidenced by the promotions that have been awarded to staff members, the increase in the numbers of faculty staff working towards PhDs and the number of publications that have been completed within this REF cycle. It is also evidenced by the increase in our contracted researchers and PGR students. Over the REF2014 period we employed 7 research assistants (all bar 2 on <1 year contracts, no post-doctoral students) whereas over this REF period we have employed 13 post-doctoral students and 10 research assistants (all bar 2 on >1 year contracts).

**To engage more fully with end-users of our research to drive research activities and to more effectively harness potential impacts of our research.**

We have sought to encourage “impact-thinking” through increased engagement with research end-users. A key strategy for the OPRG has been to engage proactively with the armed forces, emergency services and industry in the UK and overseas, and to involve them in the commissioning of research projects. In 2017, a representative from the Defense Science and Technology Laboratory (DstL) was seconded to us using CloS investment to exchange knowledge and expertise in military occupational performance. This approach has been particularly successful in enhancing the impact of our research as activity within the OPRG has directly supported 2 of our impact case-studies.

This approach has been mirrored within other themes. Our researchers in women and sport have, since 2014, partnered with Females Achieving Brilliance (FAB), a network dedicated to mentoring, promoting and inspiring women leaders in sport, to develop, host and deliver an annual Women’s Sport Leadership Academy (WSLA). This provides bespoke development opportunities, informed by our research, for future and current women leaders in sport. This initiative has brought our researchers into contact with a vast network of women in sport who have participated in, and benefitted from, our research activities.

We have developed more proactive relationships with other end-users throughout this REF cycle. This was one driver behind the University's decision to apply to become one of 8 UK-wide Women's Football Association High Performance Centres, and to commit resources to running this through CloS. This centre provides further opportunities to discuss the research requirements of the Women's FA and to disseminate our research findings directly to end-users. This has informed the research activities of those working with the Enhancing Sport Performance and the Equality and Diversity in Sport themes. The success of this link is evidenced by our successful application for FA funding to research the training of Women's referees. We have also continued our collaboration with the Royal Yachting Association (RYA; see REF3 from REF2014). In addition to working with the RYA to set up a bespoke BSc in Performance Sailing in 2018, we have continued the longstanding research and consultancy links with the organisation. In the current REF cycle, 1 PhD student completed an RYA-funded programme of research (maturation processes and talent identification) and 1 student has registered on another (developing decision-making skills in elite level sailors).

To further accelerate interaction with end-users, a key assessment criterion for bids to the CloS research fund is the extent to which end-users have been involved in research development. Further, since 2016, we have offered a networking fund designed to support the development of links with external organisations. These activities have led to proactive research discussions taking place with a range of users and, currently, research projects are being undertaken with a number of organisations (e.g., EasyJet, Brighton and Hove Albion FC, and ESL Gaming UK, a leading eSports firm).

#### **Future strategic aims and goals for research and impact**

We aim to increase the overall quality, quantity and impact of the research that we produce. The principle strategies for achieving this will be to grow the number of staff with SRR and the provision of targeted support for those themes with the greatest potential to attract research funding and produce impact.

- **Embed the 2018 merger and exploit the potential in our enhanced capacity.**

The formation of CloS increased the number of staff within this unit and presents an opportunity to grow research activities. With the merger, opportunities for the development of research skills, contributing to existing projects, and developing new ones have increased and there is increased uptake of developmental activities from staff (e.g., since 2018, 5 members of staff have enrolled on PhDs). Currently, 19 staff members are working towards SRR. Thus, one planned intervention to achieve growth is to increase development opportunities to support and retain members of staff with research aspirations. This will be achieved through a range of mentoring models/practices to support staff to develop, providing a broader range of developmental activities, and by developing an MRes programme to provide PG level supervisory experiences to a wider range of staff. Given the current profile of staff without SRR, it is anticipated that this will principally benefit the development of the Optimizing Practice in Physical Education and Enhancing Sporting Performance themes.

- **Expansion of themes with the most potential to attract research funding and to produce impactful research on an international level.**

Given the success of our strategic focus on developing the Occupational Performance theme, we will continue to provide support for bid writing and project administration (through targeted enhancement of research time and the employment of a Projects Support Co-Ordinator). Following our success with EU funded partnerships, and curriculum developments in health promotion (MSc) and physiotherapy (BSc and MSc), we will also target an expansion of the Health and Well-Being theme. This has already begun with the appointment of Yu, to support research in clinical populations. Additionally, in 2020 we started physiotherapy degree programmes and employed 2 FTE with developing research profiles in rehabilitation and injury prevention. These

appointees will support our existing strengths in injury and injury prevention and have the capacity to contribute to Occupational Performance, Enhancing Sport Performance and Health and Well-Being themes. By 2022, we plan to have recruited a further 4.0FTE.

- **Capitalizing on University-wide developments to promote inter-disciplinary research opportunities and develop existing research strengths.**

We will build on our existing collaborations with departments across UoC (e.g., Psychology and Counselling, Dance) and will seek to strategically invest in inter-departmental collaborations, such as the EU funded SHIFT and SBS projects in the Health and Well-Being theme. The University has, in the last REF cycle, benefitted from GBP35,000,000 of investment by the University, HEFCE and the Coast to Capital Local Enterprise Partnership in the tech park (<https://www.chi.ac.uk/about-us/engineering-and-digital-technology-park>). Working alongside the departments of Engineering and Design and Creative and Digital Technologies we have forged opportunities to establish new areas of research activity such as Sports Engineering and Esports. In the next cycle we aim to grow collaborative research with these departments.

## 2. People

### Overview

Our overall aims are to provide support to **all** members of staff (including PGR students, contract researchers and those without SRR) to develop as researchers and to recruit/retain people with the potential to produce excellent, impactful research. We believe that we have been successful in doing this over this REF cycle as is evidenced by:

- **11 Readerships/Professorships awarded.**
- **Increased enrolment on PhD programmes by existing faculty (currently n=9).**
- **94% increase in registered postgraduate research students (from 17 to 33)**
- **Above sector average ratings in the last Postgraduate Research Experience Survey entered (2017) and 100% satisfaction with the development of research skills.**
- **Employment successes of former post-doctoral students.**

The University subscribes to Vitae and CloS has adopted various of recommendations for good practice in researcher development.

### Staffing Strategy & Staff Development

#### Recruitment and retention

##### *Recruitment to Teaching and Research Contracts:*

We always consider research experience and potential in the selection process. Within CloS, we seek to recruit staff who complement and amplify existing research strengths into roles that suit their strengths. For instance, **Datson** (SL in Performance Analysis) was appointed from her position as Head of Sport Science (Women's) at the Football Association, and **Murray** (SL in Sport and Exercise Psychology 2016-2019) was appointed on a fractional post whilst continuing to work as a sport psychologist with a Premier League Football Club to contribute to applied sport science research.

Over the last REF cycle, the University has sought to retain staff through regular promotion rounds. The CloS has successfully supported 11 staff through this process.

##### *Recruitment to Research Only Contracts:*

One indicator of our vibrant research environment is the growth in post-doctoral (research fellow) and research assistant numbers. Over the census period, the CloS has recruited 13 post-doctoral researchers and 7 research assistants. Whilst fundamentally selected for their ability to contribute

to specific projects, a secondary consideration for employment has been their ability to contribute to other research programmes or the development of researchers within CloS. For instance, *Lee* (Research Fellow) was recruited to assist with the setting up of advanced biochemical assays and *Piggott* (Research Fellow) was employed to develop collaborative projects within the CloS around the theme of women in sport.

Following appointment, all staff are, in addition to formal induction procedures, invited to discuss research and their research aspirations with the Research Lead. This is designed to ensure appointees are familiar with the research culture of the CloS, are aware of policies and initiatives, and are aware of who to approach for support. It is also to gain a greater insight into the research strengths and possible contributions of the appointee.

### Staff Development

Researcher development is a key part of the University's research strategy, which states that all academic staff "have opportunities to develop their own research activity as well as their skills and knowledge" and "have access to facilities and support to enable them to undertake research at the required level." These aspirations are shared by this Unit and so we have developed a range of development opportunities which are open to all staff members.

All academic staff (including Research Fellows and including staff without SRR) benefit from 25 days of research leave entitlement to pursue projects and/or development activities. This is monitored by line managers and is a discussion point in annual reviews.

At the University level, the Research Office offers a wide range of development and training activities and also hosts an annual research conference designed to communicate the research activities and achievements of staff across the University, with a particular focus on promoting inter-Institute collaborations. These activities are open to all staff to attend.

Within CloS, each staff member's research activities, plans and development needs are discussed and developed through annual performance review with their designated line manager. This is supported by an annual, optional, meeting with the CloS Research Lead to discuss plans and to discuss potential development priorities and opportunities. From such meetings, informal mentoring and development plans are developed. This can include the enrolment on external post-graduate qualifications (e.g. Lomax, Sims), external mentoring using the visiting fellow system (e.g. Christian, Bright), supervision of specific programmes of research (e.g. Perkins, Pulling, Crisp, Kelly), provision of mentoring on specific aspects of research via the research champions (e.g. *Runswick* was supported in bid development by **Blacker** and **Myers** leading to the successful bid to the International Blind Sports Federation). For contract researchers, such appraisals also focus on career guidance and development. This has led to contract researchers being included in supervisory teams (e.g., **Siddall**, *Lee*, *E. Walker*), contributing to curriculum development initiatives (e.g., Needham-Beck) and taking on additional teaching duties (e.g. *Coakley*, **Rue**, **Siddall**).

A series of CloS development activities are offered to all staff and PGR students. We hold weekly CloS research seminars. These sessions provide research training and bring together our researchers to discuss and share good practice and to stimulate ideas for future research projects and collaborations. In addition, staff members can discuss elements of the research process (e.g. impact, funding, ethics, public engagement) with Research Champions. In 2018, to support these activities and to provide a readily available repository for development resources, we created an online moodle page dedicated to CloS research. This is designed to include information on development activities, research seminars recordings, information concerning funding availability etc.

We also make funding available to support staff development. This funding supports external training activities and conference attendance. All staff, including PhD students, can apply to the CloS Research Fund for project support. For all of these funds, there is a standard application



process and criteria are published in advance. Where possible, a balanced panel is convened to decide on the awarding of such funds. As previously mentioned, we also have a networking fund designed to facilitate interactions between our staff and business and other organisations.

In addition, we are mindful of providing ECRs with targeted opportunities to develop their skills and experiences. This has been developed over this REF cycle in response to the large cohort of staff who are working towards SRR. Support for ECRs achieved through the normal use of reduced administrative loads for staff when first appointed, through strategic inclusion of ECRs to PhD supervisory teams (over the last 24 months, 6 members of staff without supervisory experience have been included in supervisory teams), and the aforementioned mentoring options. We also host an annual ECR conference that mixes research presentations with development sessions (e.g. funding, impact). In 2021, we are planning to validate an MRes in Sport. This will be a further vehicle for all staff, and particularly ECRs, to develop supervisory skills and to support their research programmes.

Over the last REF cycle, our approach to staff development has clearly been successful in terms of the number of academic promotions that we have received. It has also been successful in assisting contract researchers to gain permanent contracts at UoC (e.g. **Datson**), other HEI's (e.g. *Lee*, Coventry; *Coakley*, St Mary's) and within industry (e.g. *Hinde* and *E. Walker* to DstL and **Maroni**, to the Defence Science and Technology Group (DSTG) in Australia).

### Support, training and supervision of PGR students

A vibrant and integrated postgraduate community has always been a hallmark of our research environment. In 2017, we used the Postgraduate Research Experience Survey (PRES) to gauge the quality of our support. 90% of students were satisfied with their programme, compared to 82% across the Sport and Exercise Sciences, Leisure and Tourism sector. 100% of students were satisfied with the development of their research skills (compared to 86.5% across all sectors and 87% in the sport sector).

PGR numbers within the Unit have nearly doubled since the last REF. This increase is due to strategic investment in PhD students, the strategic reinvestment of funded research income (6 funded studentships since 2014), and our efforts to engage with end-users who partially support PhD studentships (the RYA, St. Richards Hospital, Chichester). We have also been more successful in attracting self-funded PhD students interested in pursuing research with our established researchers.

	REF 2014	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	REF2021 Total
Registered PGRs	--	25	26	25	28	34	33	33	58
New PGRs	17	7	4	5	4	3	6	4	33
Doctoral Awards	14	2	3	0	0.7	4	5	3.5	16
Qualified supervisors*	9	9	10	9	9	10	14	12	--

Table 1. PGR student enrolment and completion numbers and supervisory capacity.

CloS strives to provide a supportive environment for PGRs and all full-time students are allocated dedicated office space and computer in the PhD Research Centre. All part-time students have access to office space and a computer. All students and supervisors complete the annual review process, which comprises of a meeting of the full supervisory team and student to discuss progress, outline goals and agree researcher development plans. This is reviewed and monitored

by the CloS Research Degrees Coordinator (RDC: **Lake**) and by the University Research Degrees Group. It is used to a) ensure progress is satisfactory, b) inform the development of training sessions and c) to offer specific advice to students for options concerning developing their skills. Over the current REF period, pastoral support has assumed greater importance within the University. Pastoral support, including access to student counselling, is available through the University's Research Office and links are provided on the dedicated Research Degree Students Moodle Page.

At CloS level, all PGRs are invited to attend and present at CloS research seminars and the ECR conference. They are also encouraged to attend and present at the University's Research Conference. CloS also runs a weekly Research Methods and Statistics workshop for PGRs, where students can receive tailored support for data analysis and research design. The RDC also hosts a monthly meeting focused on broader topics (including mental health, research impact, viva preparation) along with day training events for the PGRs. The schedules for these days are decided by the PGRs to be more responsive to their developmental needs (research skill development and career development).

Finally, all PGRs receive a fund of GBP750 from the Research Office to support attendance at external training events and conferences. PGRs are also eligible to bid for support from CloS staff development funds. For externally funded studentships, conference fees, accommodation and travel are factored into proposals to funders.

The success of our PhD training and support can be seen in the students who have gone on to gain employment as full time academic staff at a number of HEIs (e.g. Mundy, Coventry; Gavin, Southampton) or in industry (e.g. Jones, Malaysian National Sports Institute).

### **Supporting and promoting equality and diversity**

Equality and diversity are fundamental to the ethos of CloS. At recruitment, it is standard practice for all new posts (including funded PhD studentships) to be recruited using skills-based assessment tasks (e.g., oral presentation, written proposal, lab-skills assessment), transparent criteria in person and role specifications with standardized scoring, structured interview questions and balanced interview panels. This is in line with government suggestions for enhancing equality and diversity (e.g. <https://gender-pay-gap.service.gov.uk/actions-to-close-the-gap/effective-actions>). UoC is currently trialing anonymized applications and references and CloS will be part of this trial.

The CloS has balanced managements groups and a balanced research group. The CloS research group membership has been designed to ensure as diverse a representation of researchers as possible (based on protected characteristics, job role and career stage). Further, all the Senior Leadership Team and Institute Management Group have undertaken Unconscious Bias Training and this training has been made mandatory for all readers and professors and also offered to all staff. To monitor and address equality and diversity issues, there is a standing item on all CloS management meetings. The Senior Management team makes/ratifies all decisions concerning allocation of staff development and internal research funds are made/ratified by the Senior Management Team. In 2018, CloS supported two early-career female staff members to undertake Advance HE's Aurora Programme.

Procedures regarding supporting staff returning from periods of leave/illness, staff and research student well-being, workload balance are coordinated through line-managers and the Institute Director. Flexible working is supported for all staff members, with one member of staff currently having a flexible working agreement.

Equality and diversity were also embedded in the development of the unit's REF submission. As per the university Code of Practice (COP) decisions concerning research independence and significant responsibility for research were made based on pre-published criteria. CloS research seminars were devoted to presenting and discussing such criteria. All decisions were discussed

and made at annual review and communicated to all staff, with mechanisms for appeal in place. The selection of outputs also followed the University's COP and were discussed at research seminars. All potential outputs were self- and peer-assessed using REF criteria with peer-review consisting of 2 separate reviewers. Where possible, these teams of reviewers were balanced for gender. Additionally, a random selection of outputs was sent to external review to a team of, again, gender-balanced reviewers. All decisions were communicated, with opportunities to appeal provided. For impact, all members of staff were invited to submit proposals for impact case studies and to present these at a CloS research seminar.

Our commitment to equality of research opportunity is illustrated through comparison of gender balances for all academic appointments within the CloS over the REF cycle (52% female; 48% male) with CloS staff submitted to REF (48% female; 52% male). Within our post-doctoral researchers/research assistants, our split is 67% female and 33% male, whilst within our current PGR community the split is 35% female and 65% male. Of the total current PGR bursary recipients, 46% are female and 54% male. As with our gender balances, we have broadly equivalent proportions of staff eligible to be submitted for disability (eligible: 4.9%; submitted: 3.3%) and in the youngest age group (20-29 yr old. Eligible: 6.6%; submitted 10%). This is not repeated in the upper age groups (50+. Eligible: 30%; submitted: 20%).

### 3. Income, infrastructure and facilities

#### Overview

As a result of strategic decisions from the last 2 REF cycles, we achieved extraordinary growth (>900% since REF2014) in research income. Our ability to bid for and deliver funded projects has also been facilitated by investment in facilities (>GBP2,000,000 since 2013).

#### Income

Research income has risen almost tenfold from GBP590,932 in REF 2014 to over GBP5,500,000. To transform the bidding culture in CloS, the initial years of the current REF cycle witnessed a deliberate attempt to focus bidding into key funders (such as BAE Systems (Operations) Limited funded projects) where CloS had expertise. The starting strategy was to focus on small bids to maximise success, to build relationships with commissioners and to demonstrate capacity to deliver. This strategy has borne considerable fruit, contributing not only to the explosion of bidding success adumbrated above, but also the ultimate diversification of our funding sources, research portfolio and impact case studies.

We have also recruited (e.g., **Siddall**) and/or collaborated with people (e.g. Williams, Kings College London; Nindl, University of Pittsburgh) able to support staff in the bidding process. CloS's Projects Support Co-ordinator provide support for bid writing.

Notable theme highlights include:

- **Occupational Performance Theme:** BAE Systems – The development of Physical Employment Standards for Ground Close Combat roles in the British Army (GBP2,346,760). 2015-18.
- **Health and Well-Being Theme:** European Commission – “Step by Step” Project Evaluation (GBP326,707). 2017-2021.
- **Nutritional Supplementation Theme:** U.S. Highbush Blueberry Council – Blueberry Intake and Exercise (GBP71,190). 2018-19.
- **Diversity and Equality in Sport:** International Blind Sports Federation – Sport-specific classification for IBSA Football 5-a-side: Setting the Minimum Impairment Criteria (EUR23,600). 2018-2020.
- **Enhancing Sport Performance:** The Football Association – Tailoring Referee Development for the Women's Game (GBP32,000). 2019-20.

## Infrastructure

The Unit benefits from a well-stocked library, access to a range of online databases, staff in the University's research office, support from HR with recruitment and support from finance to manage grant funding. In addition to generic infrastructure for research, CloS infrastructure has been designed to support research activity at all levels. Research plans are discussed during the annual review process, and, on request, with the CloS Research Lead (**Greenlees**). Further support for aspects of the research process (bid-writing, funding opportunities, public engagement, impact planning) is provided by the Research Champions, whom staff can freely contact to discuss their development needs, and the CloS Director.

Fostering an integrated and dynamic research environment in which people can mix and share research interests, our Research Fellows and most research assistants are housed in the same hub as the PGRs, both to provide them with support and informal mentoring and to benefit from that experience themselves.

Supporting our research activity is a team of 8 technicians. In addition to maintaining laboratories and equipment, our technicians perform routine analyses, assist PGR students and write protocols and programmes for equipment.

## Facilities

Since December 2013, the Unit has benefitted from a well-equipped suite of teaching and research laboratories (UoC investment totalling GBP2,000,690) and a series of capital investments. Further investment in 2017 saw the creation of a biochemistry lab with dedicated research facilities. Our laboratories have been BASES accredited since 2000. The current suite consists of:

- **3 x research/consultancy-dedicated Physiology Laboratories** (71m<sup>2</sup>; 89m<sup>2</sup>; 20m<sup>2</sup>. Equipment includes; HP Cosmos Treadmill, HP Saturn Treadmill, Douglas Bag Racks & Analyser, K5 portable gas analyser, YSI Lactate & Glucose Analyser, Immersion Bath, Lode cycle ergometer, Finapres® NOVA, Doppler Ultrasound)
- **3 x teaching/research/consultancy Physiology Laboratories** (each ~105m<sup>2</sup>. Equipment in each includes a Woodway Treadmill, 3 x Monark Cycle Ergometers 2 x Concept2 Rowing Ergometers, 1 x Watt Bike, Douglas Bag Racks & Analyser, YSI Lactate & Glucose Analyser)
- **Environmental Chamber Laboratory** (71 m<sup>2</sup>. Environmental Chamber (temperature; -20 to +40°C & altitude 0 to 6000m)
- **Isometric Testing Laboratory** (8m<sup>2</sup>. Equipment Includes; Cybex Isokinetic Dynamometer, Isometric Bench, Constant Current Stimulator, Neurolog Pulse Generator, Delsys EMGworks®).
- **Qualitative research facility/Consultancy area** (2 rooms of 8m<sup>2</sup>; Interview room with ceiling mounted recording devices and designated analysis space).
- **Biochemistry Laboratory** (31m<sup>2</sup>); Equipment to facilitate the collection and storage of human samples (Centrifuges; Haematocrit and micro-centrifuge, centurion scientific C2 series, micro-pipettes, storage tubes, HemoCue). Spectrostar Nano spectrometer (BMG labtech) for the analysis of whole body samples via enzyme-linked immunosorbent assay and colorimetric assays.
- **1 x research-dedicated Psychology Laboratory** (52m<sup>2</sup>; Equipment includes eye-tracking equipment (Tracksys, SMI-ETG, PupilLabs). As part of a reciprocal arrangement with the Psychology Department, we also have access to virtual reality equipment (Oculus Rift and HT-Vive) and brain scanning (Functional near-red infrared spectrometry) and neuromodulation (transcranial direct current stimulation) equipment
- **2 x teaching/research/consultancy Psychology Laboratories** (93m<sup>2</sup>; 100m<sup>2</sup>).

- **2 x teaching/research/consultancy Biomechanics Laboratories** (106m<sup>2</sup>; equipment includes Vicon motion capture system, multiple Kistler force plates, Pasco portable force plates, stair climb simulation, gait analysis software).
- **Sports Therapy Teaching and Rehabilitation Space** (Teaching Clinic; 86m<sup>2</sup>, Therapy Clinic; 105m<sup>2</sup>, Rehabilitation Space; 86m<sup>2</sup>).
- **Strength and Conditioning Laboratory** (48m<sup>2</sup>). Equipment includes Pasco portable force plates, AMTI portable force plate (AccuPower), Isoinertial Measurement Units (PUSH Band 2.0) and Linear Position Transducer (GymAware, Tendo FitroDYNE, Chronojump) technologies.

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

##### Overview

The diverse research interests of the CloS and our freedom to pursue a range of projects means we have always collaborated with academic and industry partners. In the current REF cycle, we have encouraged collaboration with industry partners through recruiting staff with experience of working in different sectors, providing funding to support networking and by supporting staff (notably within the OPRG) to engage with contracted research. We have seen an expansion in our contribution to the research base and to economy and society. This is evidenced by:

- **100% increase in UK HEIs we have collaborated with to produce research outputs (as indexed in WoS alone; REF2014: 29, REF2021: 59)**
- **200% increase in International HEIs we have collaborated with to produce research outputs (REF2014: 20, REF2021: 67)**
- **130% increase in non-HEI partners we have collaborated with to produce outputs (REF2014: 16, REF2021: 37)**
- **The standing of members of the Occupational Performance research theme and the impact on policy-making decisions that their research has had (see REF3).**

##### Collaborative Activities

We have expanded our academic and industry collaborations to enrich our research environment. We have also sought to employ new staff from potential research-users and beneficiaries to increase industry links. Further, we have provided institutional funding for PhD projects that involve strong collaborations with industry partners. As an example of this, **Matthews, Pike** and **Piggott** produced a report from her doctoral study on gender, leadership and organisational change in English sport governance for the Lawn Tennis Association, which provided recommendations on future practice for the organisation.

**Academic:** Our staff contribute towards numerous existing national and international research networks. These include: Treasure Your Chest (women's breast health); Clem Burke Drumming Project (physical/psychological benefits of drumming); The Anita White Foundation (women in sport); International Drowning Research Alliance.

Our staff are involved in a range of national and international collaborations. Nationally staff have produced research outputs with 59 different UK HEIs (e.g. Oxford, Kings College London, Liverpool John Moores, Birmingham, Brunel, University College London, Loughborough) across a range of disciplines and 67 International HEIs (e.g., Monash (Australia), Copenhagen (Denmark), Brown University (USA), University of British Columbia (Canada)) in 18 countries. This is twice that seen in our REF2014 submission and further evidences the effectiveness of our strategy to encourage collaboration. We have ongoing collaboration with yet more Institutions. In addition, **Lake** has been appointed as a visiting fellow at Edith Cowan University and **M.Smith** is a visiting researcher at Kings College London.

**Industry Partners:** We have seen a 130% growth in the number of industry partners we have collaborated with to produce research outputs in this REF cycle. These include sporting organisations and governing bodies (e.g., English Institute of Sport, The Football Association, English and Wales Cricket Board, Centro Olímpico de Treinamento, Brazil, Brazilian National Football Federation, Southampton Football Club), businesses (e.g. Pepsico), Health care bodies (e.g. Public Health Agency Barcelona, Sussex Partnership NHS Foundation Trust, HCG Cancer Hospital, Bengaluru, Karnataka, India) and military/emergency services (e.g. Army Personnel, Canadian Forces Morale and Welfare Services). In addition to projects that have come to fruition, there are further ongoing projects in collaboration with a range of additional partners. These include: The Royal Air Force, Ministry of Defence, National Ambulance Resilience Unit, RNLi, Royal Life Saving Society, UK Police, Canadian Armed Forces, EasyJet, Brighton and Hove Albion Football Club, The Royal Yachting Association, The Women's Football Association, Cervus, Explosive Learning Solutions, The Health and Europe Centre, Kent and Hampshire County Councils). These collaborations have produced over 35 technical reports.

### **Contribution to, and recognition from, the research base**

CloS staff have, over the current REF period, published 247 articles (as indexed solely by WoS) and over 40 books and book chapters. Staff have also given keynote and invited presentations at a number of conferences including: 7th International Working Group on Women & Sport (IWG) World Conference in Botswana (**Matthews**), Royal Statistical Society, Royal Society of Medicine (**Datson**), British Association for Sport and Exercise Sciences, World Congress of Science and Football (**N.Smith**). Since 2014, **Day** has been on the scientific committee for the International Conference for Qualitative Research in Sport, Exercise, and Health and has acted as its chair. In 2016 the conference was organised and hosted by UoC. Similarly, UoC co-hosted an international conference on physical employment standards with **Blacker** and **Siddall** on the organising committee. Both now sit on the international organising committee for this conference. **Blacker** and **Myers** are also part of scientific committee for International Conference on Soldier Physical Performance. **J.Smith** was named by the World Conference on Drowning Prevention (2017) as one of the most influential female researchers in drowning prevention.

Our staff have reviewed for over 100 academic journals across a range of disciplines (e.g., *Journal of Sport and Exercise Psychology*, *International Review of Sport and Exercise Psychology*, *Sports Medicine*, *Journal of Sports Sciences*, *Acta Psychologica*, *Cognition and Emotion*). Researchers have reviewed grant applications for numerous bodies (e.g. Biotechnology and Biological Sciences Research Council, Economic and Social Research Council, British Academy, National Institute of Health Research, Medical Research Council, European Commission, Health and Medical Research Fund (Hong Kong)). Researchers have been invited onto a range of editorial and advisory boards. These include: *International Review of Sport and Exercise Psychology*, *European Journal of Applied Physiology*, *European Journal of Sports Sciences*, *Qualitative Research in Sport, Exercise & Health*. This represents an increase in such recognition since REF2014 (currently 12 editorial board positions). Our staff have also conducted PhD examinations at a range of national HEIs (e.g., Loughborough (2), Southampton, Leeds Beckett, Chester (2), Salford, Manchester Metropolitan, Northumbria, Ulster) and international HEIs (e.g., Queensland, Cologne, Canberra, Edith Cowan).

### **Contribution to the economy and society**

**Increasing public awareness through public engagement:** CloS researchers engage with the public in numerous ways. This has resulted in over 600 references to CloS research in media articles (reach: >497,000,000 people; estimated advertising value: GBP3,400,000), including all major newspapers, national TV news outlets and light entertainment programmes (e.g. BBC One show). Featured research includes; stress in esports (**Birch**), running with dogs (**Edmunds**), blackcurrant supplementation (**Willems**), physical employment standards in the military (**Myers and Blacker**) and the physical demands/benefits of drumming (**M.Smith**). **M.Smith's** work also featured on a Sky Arts documentary 'My View: Clem Burke' (2018). **N.Smith** has been a featured

expert on the biomechanics of football for ITV, Disney Channel and Gillette World Sport programmes and **Greenlees, J. Smith and N. Smith** provided expert commentary for Radio One Newsbeat on the science of penalty shootouts. **Greenlees's** work on personality in sport led to him being a collaborator on an IBM-RFU-Daily Telegraph collaboration that examined the role of personality in Rugby Union, producing an interactive feature on sport personality. **Matthews** has also contributed to public debates nationally (e.g. Westminster Research Seminars) concerning the advancement of women in sport.

**Influencing practice and policy changes:** Researchers within the Occupational Performance theme have influenced policy and practices within employers in physically demanding work-roles. This group (**Myers, Blacker, Rue, Ashdown, Siddall**) delivered a MOD research programme that developed new Physical Employment Standards (PES) for Ground Close Combat (GCC) roles (see REF3). The research led to new role related fitness tests for all personnel serving in the Royal Marines, British Army GCC roles and the Royal Air Force (RAF) Regiment, contributed to the decision to open all GCC roles in the UK Armed Forces to women for the first time, and informed North Atlantic Treaty Organisation (NATO) best practice for developing PES. The research of **Siddall and Blacker** has contributed to the development of Home Office guidance on fitness standards and testing protocols for the UK Fire & Rescue Service. By dint of their research expertise, **Blacker and Myers** sit on two NATO panels (Combat Integration: Implications for Physical Employment Standards (**Blacker**: secretary) and Human Impact Exposure Onboard High-Speed Boats). **J. Smith's** has provided industry reports and reviewed practice guidelines for the Royal Life-Saving Society and RNLI.

Health and Well-Being researchers (**Lowry, Edmunds, Lauder**) are currently involved with research that has been instrumental in evaluating and shaping pan-European initiatives designed to promote men's health and social connections. This involves a multi-level, multi-method assessment of the impact of the workshops and community groups across the life-course of the project, on participant's physical and mental health, wellbeing, employability and place within their communities. Also within this theme, **Day's** research on the well-being of amputees has informed the development of staff training and patient support within one National Health Service Trust, as well as informing a series of initiatives from LimbPower, a National amputee charity. **Greenlees'** work on the effects of alcohol sponsorship in sport has also been used by campaign groups to initiate change (e.g. Alcohol Action Ireland).

Enhancing Sport Performance researchers have impacted on coaching and sport science practice in many ways. Our longstanding collaboration with the RYA (REF3 from our REF2014 submission) has seen continued contribution to the performance of Olympic Sailors. This has been extended during this REF cycle with research programmes (not included in this REF submission due to current embargoing of publicly available research findings) examining maturation process and talent identification (**Lauder, M. Smith, Day**) and the decision-making processes employed by coaches during debriefing events (**J. Smith**). These projects have directly informed the practices of the RYA. Our researchers (e.g. **Datson, N. Smith, Lake**) has also influenced physiotherapy and sport science practice at a variety of elite sporting organisations (e.g. Brighton and Hove Albion Football Club, Celtic Football Club, Manchester City Football Club, Irish and English FAs) through various consultancies. Our report to the FA exploring refereeing standards in Women's Football (**Everley, Datson, Greenlees, Figgins**) is well placed to contribute to the development of training for women's referees.

Equality and Diversity in Sport researchers (**Matthews, Piggott, Pike**) collaborate with Females Achieving Brilliance to enhance the training, development and networking opportunities of future and current women leaders in sport. This has directly supported 360 senior women leaders, from over 250 sporting and sport-for-development organisations based in 62 countries. In 2019, the English FA commissioned **Everley** to evaluate their "Active Literacy through Storytelling" scheme. The research findings have supported the development of resources aimed to promote physical activity and literacy, and communication skills, in 5-8-year-old girls. In 2018, **Runswick, Datson, Blacker and Myers** were commissioned to conduct research exploring the development of evidence-based classification in vision impaired football for the International Blind Sports

Federation (IBSF) and International Paralympic Committee (IPC). This work will be instrumental in the development of new classification rules and procedures to ensure fair competition in football for athletes with vision impairment.

### **Influencing product design and commercial innovations**

Our researchers have also worked with a range of companies and organisations to inform product and process innovations. The work of **Myers** and **Blacker** has influenced process and product innovations within military-based data-analytics SME, Cervus Defence and Security Ltd, enhancing their product offering and assisting them to win over GBP1,00,00 of contracted work. **Willems'** research into blackcurrant supplementation has informed the development and marketing of a range of HealthCurranz supplements and has been credited with enhancing the demand for this product by the company (see REF3). **Greenlees** has collaborated with a commercial airline to explore the potential of psychophysiological monitoring of pilots. **J.Smith** has collaborated with a company (<https://waterphobia.com/>) in the development of an aquaphobia training course. **Lake's** research exploring the collection, processing and application of force-time data in strength and conditioning settings has been used by companies (e.g. Hawking Dynamics) to inform the development of instrumentation and associated software that is now widely used by strength and conditioning coaches. This has helped this start-up company to grow and to realise sales in excess of GBP1,200,000.