

Institution:

University of Essex

Unit of Assessment:

24 – Sport and Exercise Sciences, Leisure and Tourism

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

In REF2014, the Centre for Sport and Exercise Sciences (CSES) researchers made their first REF submission to UoA26 (submitting previously as part of UoA5, Biological Sciences). The success of the submission encouraged the University to make a major investment in future research in this area. This led to the creation of the School of Sport, Rehabilitation and Exercise Sciences (SRES) in August 2017 enabling a transformative growth trajectory in UoA24 at the University of Essex. Investment of £12 million in the new Sport Arena provided a location for the new School. The creation of SRES provided opportunities for future research synergies across the disciplines of **Sport and Exercise Science** (from Biological Sciences now Life Sciences), **Physiotherapy**, and **Sports Therapy** (from the School of Health and Social Care (HSC)). Fourteen academic staff from CSES and 14 from HSC joined the new School, growing to 42 for the start of the 2020/21 academic year. Whilst at its inception, the new school had a 50:50 split between staff on academic research (ASER) and academic-only (ASE) contracts, 12 new appointments since its founding have dramatically shifted this emphasis to 68% now on ASER contracts; enabling a step change in the volume of researchers submitting in UoA24, rising from 9 in 2014 to 25 in 2021, with an associated increase in PGR students and an exponential increase in research publications.

How research is structured

In REF2014 and until 2017 the UoA had two research groups; it now has three. In addition, the Human Performance Unit (HPU) which previously sat alongside CSES was fully integrated into SRES from 2018 providing additional research support and specialised testing facilities. In 2019, a full review of the HPU, undertaken by the Faculty of Science and Health, made recommendations, aligning its future focus, activities, management and strategic research goals with those of the University and SRES.

Research Groups

Staff may be members of more than one group reflecting their substantive research areas, outputs and income.

Health Exercise and Active Lifestyle (**HEAL**): This successful group has expanded with new appointments in SRES, increasing the numbers working in key strength areas such as Green exercise (**Rogerson, Wood**).

HEAL group members who are REF-eligible are: **Bateman, Barton, Clark, Freeman, Gladwell, Griffin, Hammond** (ECR), **Kerr, Liew** (ECR), **Lowry, Pethick** (ECR), **Rogerson** (ECR), **Sandercock, Taylor, Waterworth, Wood**.

(Italics indicate those appointed since 2013)

The Sports Performance and Fatigue group has expanded and is now the Sports Performance group (**SP**) (the emphasis on fatigue is no longer so relevant). It has added strength with the inclusion of staff working within elite sport (**Maynard, Jones, Hope**). New appointments including professional elite athletes turned researchers provide a particularly unique insight (in rugby: **Jones** – England 7s; **Moran** - Ireland U19s; **Waterworth** – 2017 and 2018 qualifier world championships IronMan).

SP group members who are REF-eligible are: **Freeman, Hope** (ECR), **Jones, Maynard, McManus** (ECR), **Micklewright, Mills** (ECR), **Moran** (ECR), **Waterworth**.

The growth in ASER staff enabled the formation of a third research group: Developing Young People through Sport (**DYPS**), building on existing strengths.

DYPS group members who are REF-eligible are: **Gladwell, Hope** (ECR), **Jones, Leeder** (ECR), **McManus** (ECR), **Mills** (ECR), **Rogerson** (ECR), **Sandercock**.

The three Research Groups include all staff (both ASER and ASE) and PGR students across SRES and provide opportunities to explore the significance of sport and physical activity in performance and health and disease contexts, for individuals, organisations and communities, and across the lifespan. The research groups provide a sense of belonging for all staff and help strengthen the research culture within the School. An audit of research skills undertaken by the research groups in SRES allowed for a sharing of expertise across the School and is particularly important as we look to increase research activity and confidence in the physiotherapy and sports therapy teams. The success of including ASE staff in the research groups is evidenced by: joint outputs (including, 'Are there associations with age and sex in walking stability in healthy older adults?' REF output submission), contribution to one of the impact case studies (**Coughlan**); and, identification of funding opportunities by physiotherapy staff (**Etherton, Jackson**) leading to research income (RehabWorks Ltd., **Griffin**).

Our **HEAL** group strategy has a stronger focus on exercise/physical activity and health, to align more effectively with growing physical and mental health challenges within society. We took a strategic decision to place ourselves as expert evaluators, for example, working with RehabWorks Ltd. (**Griffin**). We have moved towards more interdisciplinary research involving collaborations with external charities, councils, and partners in healthcare to widen impact and inform organisational practice and policy working in both clinical and community health settings. For example, working with a local community interest company, Provide, has led to a number of funded studentships and publications (**Jones, Griffin**).

Research within **SP** tackles basic science questions alongside projects with strong potential for societal impact. Our SP research has strengthened links with national and international organisations to: inform the content of our work; obtain research funding from both those and other organisations; and develop the resulting impact. This is evidenced in our related impact case study, where we have worked with international level sporting organisations, including USA/GB hockey, England Golf and European Tour and Russian Synchronised Swimming. Another example is funding from Basketball England supporting work exploring 'Ecological dynamics and the place of Fundamental Athletic Movement Skills in Basketball.' (**Moran**)

The **DYPS** group examines ways to: adapt sports competitions for positive individual and group-level outcomes; develop effective training programmes; facilitate optimal training environments; train effective and efficacious coaches; and improve the lives of disadvantaged and disengaged young people and youth at risk, for example, the work of **Mills** exploring 'Positive Youth Development' funded by WADA. Members of DYPS are interested in questions around the role of sport and physical activity in developing confidence, communication skills, mental health and wellbeing as well as in activity levels. Building on relationships with local schools, DYPS have agreed a set of measures to use in all schools we visit to enable the creation of a combined dataset to underpin their research. This aligns with previous work undertaken in relation to younger children by **Sandercock** with Active Essex.

Research Vision and Strategy

In REF 2014 the UoA's objectives formed the basis of the 2014-2018 CSES research strategy for growth, supporting and developing new and existing staff, and to increase grant income. Objectives to support this were to:

Objective 1) *Integrate new staff into the UoA's research structure to maximise the quality and intensity of their research.*

New staff have been integrated across our expanded research groups and supported by infrastructure spend. **McManus** moved from managing the HPU to a lecturer post supporting the closer integration of the HPU into the research structure. Using data generated within the HPU he will determine ventilatory thresholds during incremental exercise and challenge a 'new' threshold that lacks scientific evidence and is currently marketed by a manufacturer of breath-by-breath indirect calorimeters.

New research collaborations involving the disciplines of physiotherapy and sports therapy with the UoA research staff (**Jones**) have already generated publications including, 'An Evaluation of Service Provision and Novel Strength Assessment on Patient Outcomes in a UK based Pulmonary Rehabilitation Setting'.

New members of staff have worked with existing Green Exercise group members within HEAL, UK charities and non-profit organisations resulting in improvements in health and wellbeing (**Rogerson, Wood**) 'The efficacy of green exercise interventions for mental well-being'.

Objective 2) *Encourage staff to engage in research activities likely to have impact in sports performance and human health.*

We have successfully supported the application of muscle optics to elite sport illustrated by a number of outputs: 'Muscle oxygen changes following Sprint Interval Cycling training in elite field hockey players' (**Jones, Cooper**); 'Near Infrared Spectroscopy (NIRS) Observation of Vastus Lateralis (Muscle) and Prefrontal Cortex (Brain) Tissue Oxygenation During Synchronised Swimming Routines in Elite Athletes'. (**Jones, Cooper**); 'Performance comparison of the MOXY and PortaMon near-infrared spectroscopy muscle oximeters at rest and during exercise' (**Cooper, McManus**).

Hope in the SP group is using equipment within the new Sport Arena examining real-time analysis of training and competition with our specialist IP 4K cameras, with footage streamed onto our 6x4 metre electronic display screen. This indispensable feedback tool for both University and external sports teams (World champions, New Zealand Netball), also provides applied research opportunities of sports performance analysis processes. In addition, we have a range of portable equipment to analyse sports performance away from the Sport Arena, including team and individual-level filming as well as quantifying workload via GPS technology.

Objective 3) *Expand links with new and existing centres of excellence enabling the goal of fostering interdisciplinary research.*

We have PGR students co-supervised with the Centre for Brain Science, Department of Psychology and the Embedded and Intelligent Systems (EIS) Research Laboratory in the School of Computer Science and Electronic Engineering. Staff from the Institute for Social and Economic Research (ISER) were co-applicants on the successful Sport England (Essex County Council) £750K bid. In addition, National and international links include the *Sexual Health in over Forty Fives (SHIFT)* project involving collaboration with psychology at Chichester; midwifery and nursing at Antwerp University; and Odisee University in Belgium (**Lowry**).

Research aims were reviewed during the formation of SRES in 2017 and additional objectives were identified.

Objective 4) *Develop an inclusive, thriving research community including supporting ASE staff to develop a research profile to enable a transfer to ASER contracts.*

To develop a **thriving research community**, we have: grown numbers of research active staff; invested in research infrastructure; and, provided a supportive research environment facilitating our internationally excellent research.

SRES has made significant investment in new staff including appointing the first Chair in Sport

Performance (**Maynard**) and two readers (**Kerr, Lowry**) as per the commitment in our previous REF research strategy. We increased our skill base, appointing excellent ECRs matched to the research groups (**Clark, Hammond, Hope, Leeder, Liew, McManus, Mills, Moran, Pethick, Rogerson**) and additional technical staff. Staff development is evident in internal promotions (**Barton, Freeman, Gladwell, Griffin, Micklewright, Sandercock, Taylor**).

Since 2014, SRES has invested in research equipment and received substantial investment in research facilities from the University (see section 3).

The development of a supportive environment is driven by the Research Committee (RC) overseeing the strategic development of research, scholarly and knowledge transfer activities within the School and is chaired by the Director of Research (DoR).

Progress against strategic aims and KPIs is monitored by the committee. Other key objectives of the committee include: creating a high-quality research environment; developing strategies to support grant development and success; promoting interdisciplinary collaboration, knowledge exchange, and interaction with research bodies such as the NIHR Research Design Service (led by **Bateman**); reviewing staff Annual Research Plans; promoting effective research impact; and supporting a programme of research seminars. All ECRs are provided mentorship, via their 'Pathway toPpermanency' supervisor, including agreeing performance indicators ensuring they meet the required research criteria. These are reviewed on a regular basis and actions put into place where concerns are raised. New staff are encouraged to attend the University's *Newcomers* seminar series and to meet with the linked Research Development Manager from the Research and Enterprise Office (REO) so funding opportunities are matched to their research interests.

Objective 5) *Increase research income per annum by 2020; increasing per capita income of staff by increasing the number of grant applications, increasing success rates, developing new larger grants and diversifying sources of income.*

In the last REF submission income was good but dependent upon a few. With retirement and moves out into leadership roles there was an initial dip in income also associated with the recruitment of many ECRs. Over the last three years SRES increased its funding and grant capture from £59K to £733K income per annum, distributed across the staff group (see section 3).

Strategic Aims (2021-2025)

Following the successful growth and integration of sports and exercise science and rehabilitation research areas during 2014-2020, the focus of SRES will be to offer a high quality, adaptable research agenda, able to respond to the changing public health priorities across diverse communities and populations allowing us to build upon our vision of enhancing health, fitness and well-being across the lifespan.

More specifically our plans for 2021-2025 are to:

- further enhance the relevance and quality of our internationally excellent exercise and health research as applied to the areas of disease prevention, rehabilitation and health inequalities;
- maximise the impact of our research by supporting further collaborations and partnerships with national and international partners and stakeholders;
- apply a strategic, cross-disciplinary approach to research funding applications that promotes sustainability and maximises impact on sport performance and development, public health and medicine;
- continue to grow the number of active researchers within the School.

More generally, SRES will seek to strengthen translational research, driven by stronger engagement with relevant stakeholders in research design and translation of findings into practical outcomes. Building on recent success working in partnership with Active Essex and Essex County

Council (ECC), but more generally we are keen to demonstrate what public health can learn from sport and exercise sciences and how the research of SRES can help inform public health, policy and practice, reflecting the intentions of the NHS Long Term Plan. We will work more closely with general practitioners influencing Clinical Commissioning Groups to ensure all their patients have better quality guidance on physical activity and nutrition building on our evaluation work with Future Roots and Dementia Adventure. Potential funding sources include MRC and NIHR. We will maximise the expertise available within the NIHR Research Design Service and build upon the funding success of **Bateman** NIHR Brain MedTech Cooperative (£1.25mill) and NIHR RfPB grant (£245K).

Enabling impact

Objective 2 focused on impact and SRES has adopted a number of strategies to enhance potential research impact building upon the central support available within the University. Potential case studies are identified at University-level workshops and putative submissions sifted by senior research management and the Research Impact Officer in the REO who liaises with the SRES Director of Impact (Dol). The three impact case studies selected for this submission are exemplars of the successful approach to impact over the census period.

ESRC Impact Acceleration Account funds have provided invaluable support for the development of the Green Exercise impact case study including a secondment to ukactive (**Gladwell/Rogerson**, £12,668) and a Challenge Lab, 'Improving workplace wellbeing by using nature' (**Gladwell**, £9,999). In addition, **Rogerson** was employed as a research officer 2015-2018 specifically to develop the reach and impact of the Green Exercise work.

A number of strategic decisions enabled the impact of the Sports Performance impact case study including: encouraging ASE staff (**Coughlan**) to integrate into the research groups; the decision in 2014 to fund muscle optics in elite sports; the appointment of **Jones** to ensure the work was sustained with the ill health and retirement of Cooper; a University-funded impact award to judge the quality of the award (Japanese speaking assistance) and a trip by **Cooper** to Japan to evaluate the impact of the swimming documentary.

Historic funding from the Life Sciences research promotion fund supported the East of England Healthy Hearts Study together with the subsequent facilitation of **Sandercock's** development of Fitmedia which forms the basis of the Child Fitness impact case study. Additional support from an ESRC funded secondment to Essex County Council (ECC) for **Gladwell** (£11,285), PVC (Research) funding (£66K) and ESRC, Active Essex (**Sandercock**, £16,000) further contributed to the impact work.

In addition, SRES funds (or match-funds) strategic PhD studentships focused on research underpinning potential impact case studies and deploys students in areas of research related to developing impact, for example, paid employment opportunities with Fitmedia.

Open Research Environment

Open access publishing is promoted and encouraged through a range of mechanisms. All output publications are published through the University's Research Information System (RIS). From 2014 to 2021, 273 articles were deposited in the University's Institutional Repository, among which 141 were Green open access and 82 Gold open access. The University provides a central block grant for Gold Open Access publishing of specific outputs linked to UKRI-funded projects, and has an increasing number of read-and-publish agreements with publishers such as Wiley and Sage.

SRES embraces the values of open science that goes beyond publishing in open access journals, encouraging academic staff and research students to conduct and publish transparent and open research, making their data, materials and analytical code publicly available. Positive changes are visible in the increase in implementing open science practices with staff increasingly making their data publicly available. For example, **Sandercock** East of England Healthy Hearts Study hosted by

UK Data Archive has resulted in multiple publications. Staff are encouraged to share or archive data from their work and to utilise support available via the UK Data Archive who offer data skills training sessions as part of the *Newcomers* programme. Mills was the inaugural President of the Society for Transparency, Openness and Replication in Kinesiology and the founder of SportRxiv, the first community led open access subject repository for Sport, Exercise, Performance and Health Research.

Supporting a Culture of Research Integrity

We are committed to undertaking research of the highest quality in an environment with high standards of research integrity, governance and good practice. The University conforms to the Concordat to Support Research Integrity, and has developed the *University Code of Good Research Practice*, which is provided to all staff as part of training and induction. This includes explicit reference to the Committee on Publication Ethics (COPE) recommendations on publication and authorship; the department is committed to ensuring all contributors, including PhD students, gain appropriate recognition and are included in research outputs. Overall oversight of research integrity is provided by REO's Research Governance and Planning Manager, who ensures compliance with the code as well as other external legislation and funders' requirements across all projects within the department.

A responsive School ethics committee led by the SRES Ethics Officer allows for prompt review of applications for ethical approval and consistent decision making. The Ethics Officer sits on one of three Ethics Sub-Committees (ESC) of the University Ethics Committee. Applications are referred to the ESC when necessary. The School provides significant information to staff and research students about the ethics application process and its underlying principles using the Virtual Learning Environment, *Moodle*. Ethics is a standing item on the RC's agenda. To ensure good research practice the UoA has developed a portfolio of risk assessments covering core research activities to ensure safety of research participants and researchers. A technician keeps this updated as necessary and supports the development of individual new risk assessments as required. Compulsory risk assessment training was undertaken by all staff within the newly formed School in 2017 and is renewed regularly.

2. People

Nine academic staff were submitted to REF2014 and it was identified that the vitality of the UoA's research environment was dependent upon a small number of researchers with expertise in five different disciplines. A review of REF 2014 identified the need for a doubling of the FTE submission for 2021 to create a world class research environment noting that research income correlated inversely across the sector with staff/student ratios. The creation of SRES has created a larger research environment; buoyant student recruitment has enabled sustained staff growth reflected in the significant increase in the size of the UoA submission for REF2021 from 8.7 FTE to 24.1 FTE (**Objective 4**). SRES now has 24 staff on contracts with academic and research responsibilities (ASER) and 18 with contracts reflecting primarily education responsibilities (ASE). In addition, there are currently 2 research officers. Talent spotting from undergraduate courses supporting graduates to undertake MSDs and/or PhDs has made a significant contribution to the growth in our PGR student numbers. This approach to talent spotting has also provided a pipeline from PhD to academic posts in SRES (**Barton, Jones, McManus, Moran, Wood**).

Staffing strategy

The 'appliance of science' or the application of theory to practice is a golden thread running through all core activities in SRES. Our school's REF-related research themes and impact case studies are all designed 'to make a difference', to performance, health and lifestyle or human development through all elements of society and across the lifespan. To this end, from the outset of SRES, we have sought to recruit colleagues with a 'scientist-practitioner' orientation, academics whose outputs are evidence-based and have the goal to use their research to transform human experiences for the better (**Objective 2**). Examples include the work of **Lowry**, 'Rock drumming

enhances motor and psychosocial skills of children with emotional and behavioural difficulties', and **Kerr**, 'Physical education contributes to total physical activity levels and predominantly in higher intensity physical activity categories'.

The long-term aim is to increase the proportion of staff on ASER contracts by direct recruitment and to support existing ASE staff to develop a research profile enabling them to transfer contracts (**Objective 4**). As part of this process ASE staff have been supported to undertake PhDs/Prof Docs (**Coughlan, Easton, Etherton, Innes, Mallows, Utti**) providing an additional source of high-quality doctoral students. Some are contributors to REF-submitted outputs (**Coughlan, Easton**), joint supervising an interdisciplinary PhD with Computer Science and Electronic Engineering (**Utti**) and **Coughlan** is one of the authors of the SP impact case study. Research active ASE staff participate in PhD/MSD/Prof Doc supervisory boards and supervision alongside ASER staff.

Candidates applying for academic posts within SRES are required to discuss potential research collaborations and alignment with an identified research group in their applications. This ensures we recruit staff who will maximise the intensity and quality of our research (**Objective 1**). Research groups also enable recruitment, attracting staff with shared interests; for example, the recruitment of **Rogerson** and **Woods** enhanced the work of Green Exercise within the HEAL group.

To support research activity the HPU Practice Educator and Sports Scientist time is determined by the Head of School (HoS), DoR and Director of HPU, in alignment with SRES strategic priorities. The sports scientist oversees data collection ensuring high standards are maintained. Students undertaking placements in the HPU also support data collection where appropriate.

Staff development and support

We implement the *Concordat to Support the Career Development of Researchers* throughout our activities. Annual staff appraisals are conducted by the HoS and other members of the Senior Management Group, including reviews of research activities and research priorities. The University offers a structured approach to ECR development (*Pathway to Permanency*), all ECRs have a Pathway to Permanency supervisor working with them to ensure they meet the requirements for making a successful application for permanency including achievement of research targets (**Objective 1**). The faculty's Deputy Dean (Research) facilitates cross-faculty and cross-University funding applications. The School requires peer-review of grant proposals to ensure that staff are adequately supported in preparing applications. **Sandercock**, as a Professor with a high number of publications in both sports and health journals, has a specific remit to advise on possible avenues of publication that ECRs may be unaware of, suggesting additional studies, improving/optimising data collection, collaborating with others to get multi-study papers, all with the goal of enhancing the academic impact of outputs.

In SRES, ECRs on their pathway to permanency benefit from reduced teaching and administrative work loads. In their first year of employment a weighting factor of 2 reducing to 1.3 in their second year is applied to the School's workload model. In their third year this weighting is removed if good progress is being made towards meeting permanency targets. If issues are noted, then retention or an increase in weighting can be negotiated on an individual basis. The School can nominate ECRs for the University's 'Future Leader programme' and more experienced staff for its 'Strategic Leader programme'. The University has a generous research leave scheme (every 6 terms, 1 term of leave is accrued) and the RC reviews applications before they are considered centrally. This scrutiny ensures that research leave applications are well thought out and take into consideration staff development needs. Staff who have had research leave within the REF period include **Griffin, Taylor, Sandercock, Cooper, Micklewright**. In addition, from 2020/21 all SRES academic staff may apply for a short period of study leave (3 weeks maximum) to support research and scholarly development allowing staff to be responsive to short notice calls for funding or other time sensitive activities. Staff bringing in grant income receive additional research time within the workload model (teaching buy-out) and the University's research incentive scheme allows a proportion of grant indirect costs to supplement their personal research account.

Secondment opportunities are encouraged, and examples include **Gladwell's** secondment to ECC leading to a successful bid for funding to evaluate Sport England Local Delivery pilot work and **Gladwell/Rogerson** to ukactive.

Contribution to one or more research impact case studies is now included within the research criteria for internal promotion within the University. For example, Grade 10, 'Demonstrable impact of own research' - **Barton** was promoted to Reader based in part on Green Exercise impact case study; and Grade 11, 'Demonstrable impact of research included in at least one REF impact case study' - **Gladwell** and **Sandercock** were promoted to Professor based in part on the Green Exercise case study and the on child fitness testing case study respectively. In addition, the role of impact lead is recognised as contributing to citizenship for promotion to grades 9–11. All work related to impact is acknowledged within the SRES workload model and in the future all staff will be able to make an annual request for 50 hours per year specifically to develop the impact of their research.

A proportion of the School's operating budget (£15,000 per annum), overseen by the School's Senior Management Group, is devoted to individual staff budgets (£750 per person) which helps with conference attendance fees, publication fees, or research associated expenditure. Both staff and students may apply for additional support through this fund. In addition, a minimum of £30K has been used annually from the Departmental Operating budget to provide specialist equipment and consumables.

Research students

The department does not hold any DTC or DTP awards, so most students are either self-funded or are funded through departmental PhD scholarships (9 awarded within the UoA period 2014-20) and Faculty interdisciplinary PhD scholarships (9 awarded to SRES in this period).

The UoA has a vibrant and active research student community and reflects an increase in PGR students from 28 to 41.75 since the creation of SRES with a total of 91.75 within the REF period. The one-year MSD is particularly popular and provides a route through to PhD for a number of students each year. SRES has excellent completion rates for PGR students (of the 18 students competing in the last 3 year, 17 completed to time).

Doctoral Degrees Awarded

	Year of award							Total
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Doctorate	5	6	1	3	3	3.5	7	28.5
ProfDoc*	0	0	1	2	0	0	0	3
Total	5	6	2	5	3	3.5	7	31.5

*Since 2018 we offer a suite of professional doctorates ensuring that our PGR titles are all available as MSDs, PhDs or Prof Docs (2 students currently registered).

PGR students benefit from a dedicated Director of PGR studies who works closely with the DoR. The PGR Director serves as *ad-hoc* contact for students and staff, oversees student progress, well-being and sits on the RC. The PGR Director offers each student an individual meeting annually and meets with them as a group on a regular basis both formally, via the student voice committee, and informally. Each student is aligned with one of the research groups. The Director is supported by an administrator of PGR studies, overseeing administrative aspects of admission, progress, extensions, and vivas and serving as another point of support for students. The PGR Director is supported by the DoR and other experienced staff in reviewing and shortlisting student applications for funding ensuring a reliable process to select the strongest candidates for studentships.

The UoA has a policy for dual supervision for PGR students. Progress of students is monitored by

bi-annual supervisory panels where potential challenges to progression are identified. A third independent panel member chairs the panel consistently over the duration of a student's registration period. Panels making decisions confirming PhD status and completion are chaired by the PGR Director or DoR.

SRES provides desk space and priority access to lab space for PGR students. The University provides specialised training courses on topics relevant for student progress and development (e.g. advanced writing, preparing papers for publication) via its unique '*Proficio*' programme. Each student receives £2,500 to access these courses. Funding may also be used to access specialised external courses (e.g. Vicon training). The School further provides support for students to cover research expenses or conference attendance.

PGR students organise their own seminar series supported by the PGR director and in addition SRES holds an annual student and staff conference and PGR milestones require students to either submit a poster or present a paper. Students have participated in the nationwide '3 Minute Thesis Competition' and teaching skills can be developed by working as GLAs or giving guest lectures on established modules. Some PGR students have successfully applied for recognition of their teaching practices by Advance HE under the UK Professional Standards Framework.

We also encourage UG (and MSc) students to be part of our research culture (**Objective 4**). BSc project students have worked alongside PhD students and been co-authors on three published papers in Sport, Exercise and Performance Psychology, Psychology of Sport & Exercise and Nutrition, Metabolism and Cardiovascular Diseases. PGR students are encouraged to seek external funding, a recent success, a competitively awarded Student Travel Award from the Association for Applied Sport Psychology to attend a national conference in Portland, Oregon, USA. In addition, PGR students are able to work as research officers on projects including Local Delivery Pilot work, the Centre for Sustainable Health, Century Project and the Football Foundation.

Of particular note are the opportunities for PGR students to work on 'live' project work, PhD examples include: exploring recovery from domestic violence using wilderness therapy; and The Relationship Between Research and Practice in Applied Sport and Exercise Psychology.

Equality and diversity

The SRES strategic plan ensures staff and students see themselves as valued members of the School, working together to study and research within a climate of community, inclusiveness and integrity. Our aim is to foster a confident, high-performing, creative, and productive School, where we support each other in our different research endeavours. This work is promoted and recorded through our Athena SWAN team, created when SRES formed in 2017. The team consists of 14 staff and 1 PGR student. The UoA is expected to make an independent Athena SWAN submission in April 2021. Pre-2017 UoA staff were situated in departments with Athena SWAN recognition (Life Sciences, Bronze award; and Health and Social Care, Silver award). We fully recognise the importance of equality, diversity and inclusivity within the work force and in maintaining a healthy work-life balance for all colleagues. Where possible core meetings are held between the hours of 10.00-16.00 making them as accessible as possible to staff with caring responsibilities. Seminar organisers regularly consult with staff to ensure that all interests are covered. Seminars take place at varying days and times avoiding the beginning and end of the day to ensure staff, whatever their commitments, are able to participate.

We have gender balance within the SRES Senior Management Team, across our senior researchers (Readers and Professors) and across the leadership of our undergraduate programmes. Of the 42 academic staff in SRES 57% are men, and 71% of staff with a research component in their contract are men. Gender is more evenly distributed in the senior staff group and all external senior appointments since the creation of SRES have been women. Four of the 11 staff appointed with research in their contracts since the creation of SRES have been women. Research leave is available for all staff (full and part time) and plans to apply for leave are

discussed at annual appraisals. Every attempt is made to ensure that protected characteristics are considered in respect of committee membership and recruitment, including interview panels. Our REF output review and environment statement groups included equal representation of men and women. All staff can apply for support to attend conferences, including travel and this includes requests to enable those with significant caring responsibilities to attend such events. SRES supports the University's flexible working policy and within the REF period, 8 staff have made use of this to agree altered working hours. A professor with a declared disability was supported to take early retirement on health grounds but was enabled to still take an active part in teaching/research as much as possible or desired, by the granting of an Emeritus professorship and dedicated office space with step free access in the new building with associated disabled parking. Part-time staff are valued and supported to return to work after adoption/maternity leave with no hindrance to their careers evidenced by the success of **Barton** and **Gladwell** (promotion to Senior lecturer/Reader and Professor).

3. Income, infrastructure and facilities

Operational Structure

The UoA's RC oversees the School's research activities. The committee is chaired by the DoR and consists of HoD, DoI, PGR Director and the Ethics Officer. Each research group is represented by its lead. Additional members are co-opted ensuring appropriate equality and diversity representation. Research group leads convene termly research meetings to facilitate research communication within the School and to provide support in grant applications. Technicians and professional services staff support research activities and two additional technician appointments have been made since 2017.

Income

Increasing research income (**Objective 5**) has been a key focus since 2017 with individual plans discussed at annual appraisals with all newly appointed staff expected to make or contribute to a grant application during their initial 3 years. The University provides various internal grants on a competitive basis for piloting new work, developing research grant applications, supporting workshops and other follow-on impact activities, and to buy-out staff time. These include Innovation Vouchers, an Impact Acceleration Account, an Eastern Arc fund (Academic Research Consortium between Essex, UEA and Kent) and Challenge Labs, ranging from £5k to £20k. Staff in SRES are encouraged to apply for these and have a high success rate. Examples are given in other sections. SRES works closely with the linked Research Development Manager from the REO who regularly promotes funding opportunities and helps with preparing grant applications.

The majority of our commercial income comes from charities, government and public service sources (£1.2 million since 2017) including: Patient assessment tool, Rehabworks (**Griffin**, £20,000); Essex Physical Activity Local Delivery Pilot, Essex County Council (**Gladwell, Freeman, Sandercock**, £750,000), Benefits of football facilities, Good Relations Ltd.; Training programme for the development of life skills, Football beyond Borders (£14,781).

Staff have also led and collaborated on funded projects hosted at other institutions (**Objective 3**). For example, **Lowry** has been involved in assessing the occupational and leisure physical activity of army cadets Defence Human Capability Science & Technology Centre funding (£511K) and the benefits of Rock Drumming for children and adolescents with Autism Spectrum Disorder, Waterloo Foundation funding (£98K, £60K) and **Gladwell** collaborated with the Centre for sustainable Health in a successful £63K bid to the Health Foundation.

Infrastructure and Facilities

Building on considerable investments into facilities made during the previous REF period, management of the UoA ensures that staff have access to world leading facilities by continuing to invest in maintenance and enhancement of facilities (**Objective 4**). The opening of the £12 million

Sport Arena in 2018 provided a new location for SRES including a large PGR student space. To further support world leading research, the Arena is equipped with video analysis capabilities, *AnalysisPro* and the *AP Capture* system including GPS technology. Targeted investment has led to well-equipped laboratories (£90K in biomechanics equipment). Laboratory space has increased by 35% since 2014 with an additional 25% increase planned during 2021. PVC (Research) Infrastructure funds (£240K) have further enabled additional equipment purchases.

The Human Performance Unit (HPU) is integral to the success of the UoA; a public facing entity providing a service for athletes and commercial consultancy in sport and exercise science. It includes a laboratory used by clients including elite athletes, generating data used for research (**McManus, Waterworth**). Additional facilities include a biomechanics lab, hosting specialist equipment, including the Vicon system, force plates and the isokinetic dynamometer. Other accommodation includes a discrete, designated laboratory room for biochemical analysis, a dedicated room for body composition analysis including dual x-ray absorptiometry (DeXA) and a new strength and conditioning area including Olympic lifting platforms and rigs for multiple resistance training-based interventions including force-velocity profiling, velocity-based training, strength diagnostics and athlete profiling in multiple sports.

The HPU offers three key areas of expertise to support the research agenda in SRES: participant recruitment; organisation, administration and collection of data; and, support for using specialist equipment. Aligning the goals of the HPU with SRES has facilitated effective support for the research groups, examples of how the research groups work with the HPU were provided in section 1.

The majority of equipment purchased in this REF period has been supported through strategic investments from the University demonstrating its commitment to research. Equipment purchased has broad reach across SRES, cutting across research groups within a number of areas. In addition to standard equipment (including – blood pressure monitors, heart rate monitors, ECG, blood analysis equipment, ergometers, treadmills, body composition, gas analysis), as expected in any department hosting UoA24, specialist equipment to support the cutting-edge research work associated with the University has also been purchased, supporting work including: cardiopulmonary rehabilitation; activity monitoring; cardiometabolic/nutrition; evaluation and survey work; movement analysis, and; sport performance. This allows for inter-disciplinary and trans-disciplinary research reaching beyond the immediate discipline and associated areas.

Promoting high quality research and opportunities to collaborate with external organisations, strategic investment has been made in specialist equipment addressing gaps in current NHS provision/capacity, such as DeXA, Vicon, Kistler force plates and the Biodex isokinetic dynamometer. Motion capture equipment has been used by staff and PhD students exploring gait changes in older adults and has supported the publication of a number of papers. Equipment such as DeXA, enabling measures of body composition, should increase our likelihood of publishing in higher impact journals outside of sports science by ‘medicalising’ the approach and through use of state-of-the-art techniques. Similarly, the Biodex will underpin joint research grant applications with orthopaedic surgical specialists (**Clark**) and be used by PhD students.

Examples of work that this equipment has supported include: Near infrared spectrophotometer (Portamon and Portalite system, MOXY monitors) supporting research informing exercise prescription and its monitoring. Blood analysis equipment (Biosen C line clinic, Arkray Lactate Pro/Pro2, Hemocue Haemoglobin, Accutrend Glucose and Cholesterol, Cholestech, Afinion 2). The Cholestech and Afinion 2 were fundamental to a grant application submitted to Innovate UK and Heart Research UK in which the use of this equipment will enable measurement of blood lipid profiles, glucose and glycated haemoglobin levels. Ergometers (Monark Arm crank and cycle, Lode Excalibur, Wattbike, Velotron) and treadmills (HP Cosmos Saturn, Woodway Curve) have also enabled a number of PhD studies, as has the purchase of a modular putting green used within PhD/published work. The GPS System supports PhD students’ work investigating the 3-minute all-out running test as a measure of critical speed in elite and sub-elite football. Qualtrics survey software has been used by PhD students exploring social and communication skills in children with

ASD and talent identification in football and for use in other projects, including: Sport England Local Delivery Pilot work and the collection of data from over 2000 roller derby players.

Through collaborations across the University (**Objective 3**), SRES staff and PGR students have access and used other equipment including but not limited to: transcranial magnetic stimulation, electroencephalography, virtual reality suites, observation suites, and head mounted eye-tracker. Equipment from the EssexLab enabled data collection from large cohorts, for example in the morning Adrenaline Rush project (**Gladwell, Freeman**). External to the University equipment and software from Kings College London's Institute of Psychiatry, Psychology & Neuroscience was used in the Rock Drumming Research (**Lowry**) including a 3T MR scanner.

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

Collaborations

The creation of SRES in 2017 with the associated changes in its size, structure and disciplinary profile allows us to address problems by drawing on a wider range of expertise and professional experiences. The staff profile and breadth of research undertaken positions us to engage in collaborations with a wide range of partners both internally within the university and externally with a range of stakeholders. Our research is data-driven, with expertise in applying our knowledge and skills to other organisations' data and evaluating interventions, with examples from working with organisations such as RSPB and ECC, undertaking research in areas ranging from cardiac rehabilitation through to match analysis. This fits closely with University-wide developments in Data Analytics, and projects have involved collaboration with researchers in ISER (**Objective 3**), building on their world-leading expertise in longitudinal studies, data linkage, evaluation of policy changes and policy development (Active Essex, Local Delivery Pilot, The Wildlife Trust).

Cross-School collaborations are also facilitated by faculty funded PhD scholarships. Since the faculty launched these cross-faculty scholarships, SRES staff have successfully secured funding for 9 PhD students demonstrating how well the UoA is connected across the faculty.

As well as many internal collaborations staff have significant external interdisciplinary links including: Sport England (**Gladwell, Sandercock, Freeman**), RFU (**Jones, Mills**), International Olympic Committee (**Freeman**), Basketball England (**Waterworth, Moran**), Canadian Paralympic committee and Swimming Australia (**Hammond**), WADA (**Mills**), British Army and Cirque du Soleil (**Clark**), ukactive (**Rogerson, Gladwell**), Active Norfolk (**Leeder**), Wildlife Trusts (**Rogerson, Barton, Wood, Gladwell**), MS-UK (**Griffin, Taylor**).

A range of specific examples below illustrates the achievements of some of these collaborations.

Gladwell was seconded to ECC between March and December in 2017 (via ESRC, IAA funding). Based at County Hall in Chelmsford one day a week to build on the innovative work previously undertaken at Essex (**Gladwell, Sandercock**) to inform how ECC could use the considerable resources in Essex, in pursuit of improving the physical, emotional and spiritual wellbeing of the Essex population. This enabled ECC (in particular Active Essex) to evaluate more of their physical activity services/programmes and to undertake additional evaluation of services; enabling ECC to identify the wider outcomes of physical activity and how to robustly measure them. In 2017, this culminated in ECC being one of the twelve consortia awarded £10 million to implement Sport England's local delivery pilot schemes to transform the delivery of physical activity locally through system change. **Gladwell** and **Sandercock's** ground-breaking research, a key component which assisted ECC to win this award and a number of SRES staff are now involved in this externally funded project involving evaluation of the Sport England Local delivery pilot in Essex (£750K (**Freeman, Gladwell, Sandercock, Pettican**)). This increases the understanding of physical activity levels and health inequalities, and the role of capability, opportunity and motivation in explaining physical activity (COM-B model). To facilitate this project, key external collaborations have been formed with Mansfield (Brunel University), Copeland (Sheffield Hallam), and internally with colleagues from across the University of Essex; Reinhardt (School of Government) and Al Baghal

and Knies (ISER). This is an example of how initial engagement with an organisation has led to an ongoing and developing relationship working on funded projects.

In related work **Gladwell, Freeman, Sandercock, Pettican** have worked with external companies (Jump Projects, Reason Digital, Impact Reporting) to establish a progressive web app-based survey tool that public sector partners (Active Essex and ECC) will use to evaluate all of their physical activity related projects.

The University joined the successful bid to create the NIHR Applied Research Collaboration East of England (ARC EoE) in 2018. This provides opportunities to increase and develop collaborations in relation to health research. **Bateman** a contributor to the UoA 24 submission is the Director of the NIHR East of England, Research Design Service and leads the neuropsychological rehabilitation theme within the Brain Injury MedTech Co-operative. The expansion of healthcare provider contacts builds upon a number of existing strong relationships with Provide a local community interest company (**Jones, Easton**), East Suffolk and North Essex NHS Foundation Trust (ESNEFT) (**Griffin, Taylor, Liew, Clark, Kerr, Utti, Jackson**), RehabWorks (**Griffin**), and Anglia Community Enterprise Community Interest Company (**Liew**). The ongoing work with Provide exemplifies the success of sustained collaborations. An initial service evaluation of differences in patient outcomes of pulmonary rehabilitation programmes of different durations led to work around novel strength assessments (**Jones, Andrews, Easton**) and is now supporting a funded PhD student, with a cross faculty supervision team, exploring strength assessments and strength training in pulmonary rehabilitation. As well as influencing local practice, successful outcomes from this work have the potential to inform national clinical guidelines.

In 2017 **Sandercock** and **Jones** won a competitive tender to evaluate a change in legislation for age grade (u7-u19) rugby in the UK, by the RFU which has developed into an ongoing relationship. A rule designed to impact on player retention (reducing drop out from sport), between 2017-2020, a pilot to evaluate and a staged integration of the rule change into club and school rugby for age grade rugby was undertaken. One immediate impact was that the rule (Half-Game Rule) became legislation for the 2019-2020 playing season. They are now (2020-2023) evaluating the player registration data and will each year carry out focus group work to look at the longer-term impact on player retention/attrition. This work is available on the RFU website and all clubs were provided with an infographic that **Jones** helped design. In addition, the work has received national news coverage (The Times, ITV Anglia News).

The opportunity to engage beyond the discipline is further supported through University challenge labs (ESRC Impact Acceleration Account, EIRA funding) and our commitment to supporting projects outside of SRES as staff contribute to cross-disciplinary bids. Two projects have focused on mental health in youth: 'Performance banded physical education classes to improve fitness and mental health outcomes in youth' (£9,556 – ESRC IAA) (**Jones, Moran, Hope**) and Resistance exercise to improve outcomes in youth with mental health problems (£9971 - ESRC IAA) (**Moran, Hope**).

Examples of confirmed future activities, with both internal and external partners both national and international, include:

- Using Global Challenges Research funding a visit (**Kerr, McManus, Lewis**) to South Africa established a collaboration with the University of the Western Cape. **Kerr** will be working with Professor Susan Bassett and has secured an additional £6135 to explore the feasibility of time-restricted feeding for weight loss and type 2 diabetes prevention in UWC students and Dr Barry Andrews will be working with **McManus**;
- Carlile Archive Phase One (AU\$10,000) with Dawn Penney (Monash/Edith Cowan AUS). ESRC Impact Acceleration Account (£10,006) to use video documentary to study the narratives of children returning to school post UK COVID lockdown with **Lowry, Hammond, Blower** (LiFTS) O'Gorman, Poerio (Psychology) Chiu (Linguistics), Etheridge (Economics) and Gemma Warsap (ECC) and £9,920 to study the COVID community volunteering recruitment, organisation and responses during 2020 and 2021 lockdowns with **Lowry**,

- O'Gorman, Poerio (Psychology), ECC and The Active Wellbeing Society;
- Links between **Kerr, Lowry, Waterworth** and researchers (Dr Soliman / Dr Jan) at Fakeeh Hospital, Jeddah, Saudi Arabia are developing research in management of obesity and type 2 diabetes;
- Public Health Collaborations – EU European Regional Development Fund Interreg 2Seas Funding (**Lowry**) for two projects with partners in the UK, France, Belgium and the Netherlands Step-By-Step (2.6 million Euros) and Sexual Health in the over Forty Fives (4 million Euros).

Contributions to research base and discipline

UoA staff are heavily involved in contributing to the discipline and research base of sport and exercise science, including: editorial work; peer review processes for both outputs and grant funding; committees; delivering keynote lectures; associated conference activities.

Editorial board membership/Editors: *Journal of Sport Psychology in Action* (**Maynard - editor, Freeman**), *International Review of Sport and Exercise Psychology* (**Freeman**), *Environmental Psychology* (**Barton – review editor**), *Frontiers in Psychology* (**Barton**), *PLOS ONE* (**Micklewright**), *Frontiers in Physiology* (**Moran, Micklewright – Topics Editor**), *European Journal of Sport Science* (**Moran**), *Frontiers in Sports and Active Living* (**Moran**), *Isokinetics and Exercise Science* (**Clark**), *The Sport Psychologist* (**Maynard**), *Science and Medicine in Football*, *Frontiers in Psychology* (**Mills**), *Journal of Applied Sport Psychology* (**Maynard**)

National grant review (NIHR, ESRC, MRC, Versus Arthritis, CSPCT) International reviews including the European Commission, Health and Medical Research Funder – Government of Hong Kong, and the Polish Ministry of Science, Advanced Olympic Research Grant Programme, Social Sciences and Humanities Research Council of Canada, Research Grants Council of Hong Kong (**Lowry, Freeman, Gladwell, Jackson**).

In addition to peer reviewed articles and acting as journal editors, 11 members of staff have also written and edited books, chapters and national guidelines since 2013.

Research excellence has also been acknowledged via a number of awards and honours including: Association for Applied Sport Psychology (AASP), Distinguished Professional Practice Award in 2015 (**Maynard**) and British Psychology Society (BPS), Lifetime Achievement Award - Distinguished Contributions to Sport and Exercise Psychology, 2019 (**Maynard**). A number of staff are fellows in organisations, including the Physiological Society (**Gladwell**), BASES (**McManus**) and BASES, ASSP, BPS (**Maynard**).

Our research has been disseminated via **keynote presentations or expert panel membership** at meetings including:

- Belfast NHS Trust Health Conference 2017 British Psychological Society's Division of Sport and Exercise Psychology Conference 2020 (**Lowry**);
- Solutions to Isolation, Green Spaces Better Spaces (**Rogerson**);
- Green Exercise Concept, Mindscape, Ireland, Cheltenham Science Festival, International Mountain & Outdoor Sports Conference, Prague Czech Republic (**Barton**);
- European Society for Sports Traumatology, Knee Surgery and Arthroscopy (**Clark**), International Congress of Sport Science, Turkey, British Society of Academic and Clinical Hypnosis Annual Conference, (**Maynard**);
- Science in Cycling Conference, Nantes, France, 1st Endurance Research Conference, University of Kent, Annual Conference of the American College of Sports Medicine Orlando, USA (**Micklewright**);
- A meeting of minds: the biology of mental health BASES, Institute of Healthcare management (2021); Landscape Institute (2020); Centre for Sustainable Health (2020) (**Gladwell**);
- ukactive national summit, London: Borrowing from abroad - Exploring what we can take

from other nations' approach to tackling youth inactivity; Open Forum Events: Exercise and Health- Active lifestyle, Better Life Conference, Manchester. What are the barriers to activity in youth? BHF Preventive healthcare practitioner conference - keynote on trends in sedentary time PA and children's cardiovascular health, Westminster Education Forum Keynote Seminar: School sports – increasing participation, improving PE provision and tackling the 'inactivity crisis' (**Sandercock**).

We have made important contributions to **professional associations** via conference organisation: Congress committee European Congress of Sport Science (**Maynard**).

SRES hosted the IDEAL Pacing and Coaching Symposium in September 2018 which was co-funded by the Erasmus+ programme, and had speakers from Essex and across the EU (**Freeman**, **Micklewright**).

SRES staff are represented as **board members, trustees, or scientific advisors** on a number of different organisations including: Parkrun Research Board (**Rogerson**), Expert Advisory Group – Public Health England (**Pettican**), Chartered Society of Physiotherapy Charitable Trust (**Jackson**), Advisory board member for the University of Konstanz, Germany Research Excellence Initiative (**Micklewright**),

International PGRs are a developing area in SRES. An example is the collaboration with Massey, NZ. Expertise in muscle oxygenation measurement (**Jones**) leading to a collaboration with Professor Ajmol Ali to collaborate on a series of studies investigating the effect of beetroot juice consumption in younger, older, pre-hypertensive and pre-diabetic people. **Jones** and Ali now co-supervise a Massey based PhD student. In addition, **Jones** has provided NIRS training and expertise that will help other Massey students with higher quality data collection, and publications in higher-quality journals. Professor Ali has visited the University of Essex twice, presented to staff and PG students, led to one collaborative grant application (New Zealand Heart Foundation) and one publication with others from the PhD studentship planned). We have also explored PGR student and staff exchanges between the institutions, **Sandercock's** trip to Massey, 2019.