

<b>Institution:</b> Canterbury Christ Church University
<b>Unit of Assessment:</b> 24. Sport & Exercise Sciences, Leisure & Tourism Studies
<p><b>1. Unit context and structure, research and impact strategy</b></p> <p><b>1.1) Context and Structure</b></p> <p>Ranked in the UK top 20, and top 10 'small submissions' (FTE&lt;15), in REF2014 (Times Higher GPA), our REF2021 submission builds on our continuity, consistency and focus over a 20-year period across three REF/RAE cycles. Our research is defined by a longitudinal values-led commitment to improve health, wellbeing and welfare among groups not well served by existing provision and policies, including those with or at risk of long-term conditions, in socially, physically or emotionally vulnerable groups, with disabilities or special educational needs (SEN), or experiencing economic, social or cultural exclusion.</p> <p>The Unit has grown to 19FTE, and is centred in the School of Psychology and Life Sciences, incorporating <i>SportsLab</i>, our applied translational research and enterprise service, and including the University Research Centre, <i>spear</i> (Centre for Sport, Physical Education &amp; Activity Research).</p> <p><b><i>Our strategy has been to sustain and intensify the vitality of our research environment by enhancing and increasing investment and support to further grow and deepen the quality and reach of our distinctive research and impact shown to be world-leading in REF2014.</i></b></p> <p>We have:</p> <ul style="list-style-type: none"> <li>– <b><i>Increased by a third</i></b> staff with Significant Responsibility for Independent Research</li> <li>– <b><i>Doubled</i></b> research income</li> <li>– <b><i>Tripled</i></b> PhD completions</li> <li>– <b><i>Invested £9m</i></b> as part of a new £65m specialist STEM facility which houses the Unit.</li> </ul> <p><b>1.2) Development and Delivery of Strategy</b></p> <p>Our strategy spans REF/RAE cycles, and is based on dynamic and responsive longitudinal development and investment in distinctive specialist programmes of research across our three long-standing themes:</p> <ul style="list-style-type: none"> <li>• <b><i>Clinical Exercise Science (Coleman, O'Driscoll, Taylor, Wiles, supported by Brown, Mills)</i></b> explores the impact on blood pressure and cardiac health of: <ul style="list-style-type: none"> <li>– Isometric exercise in clinical, pre-clinical and 'at-risk' populations</li> <li>– High intensity interval training (HIIT) in clinical, pre-clinical and 'at-risk' populations</li> </ul> </li> <li>• <b><i>Human Performance (Brighton, Brown, Edwards, Hurst, Roelands, Uphill, Williams, supported by Coleman, Foad):</i></b> <ul style="list-style-type: none"> <li>– Placebo effects, performance, anti-doping and athlete welfare</li> <li>– Functional mobility in disabled and aging populations</li> </ul> </li> <li>• <b><i>Policy, Politics and Education (Butcher, Chatziefstathiou, DeVivo, Dowse, Foad, Jackson, Lovell, Mills, Skourtis, Weed, supported by Brighton, Uphill):</i></b> <ul style="list-style-type: none"> <li>– Olympic/Paralympic legacies</li> </ul> </li> </ul>

- Physical activity and sport policy and promotion for the least active
- Perinatal physical activity
- Authenticity and value in tourism

Our specialist research programmes are strategically identified and developed from initial exploratory research, which is based on responsiveness to user-led questions or diversification of existing research. Current exploratory research not yet reflected in our research programmes (but variously visible in REF2,REF3,REF4) includes mental and physical fatigue and endurance, embodied and social experiences of performance in ageing and disabled populations, and processes by which physical activity and sport interventions can develop wellbeing and social and life skills in disabled, SEN and general populations.

To develop our specialist research programmes, we establish long-term strategic goals, user-needs and expected outcomes, and set milestones towards achieving them, often over decades rather than years across multiple REF/RAE periods. For example, our three longest-standing research programmes, in isometric exercise, placebo effects and Olympic/Paralympic legacies, all originated in RAE2008. However, we also continue to innovate, and have developed emergent early-stage programmes by diversifying isometric exercise research to explore the impact of HIIT on blood pressure and cardiac health, and by coalescing staff around user-led research into authenticity and value in tourism.

Each research programme has a long-term, multi-stage timescale, for which our strategy is to identify drivers of success (collaborations; resources; staff development/recruitment; doctoral studies), and markers and milestones of success (outputs; impacts) appropriate to each stage of development, recognising that drivers and milestones are likely to vary at each stage, and for each programme. For example: collaborative research and funding is currently driving the establishment of proof-of-concept in the early-stages of our functional mobility programme (3.1;4.1); early-stage drivers for our programmes in Olympic/Paralympic legacies, and physical activity promotion for the least active, were initial small-scale user-funded projects to establish 'what works' (reported in REF2014); a series of internally funded doctoral studies developed strategically to establish proof-of-concept were early-stage drivers for our placebo effects and isometric exercise research programmes (reported in REF2014); and our strategic ECR appointments of **O'Driscoll** (REF2014) and of completed doctoral student **Taylor** (REF2021), were drivers of the diversification of isometric exercise research to develop our early-stage HIIT programme (2.1).

Markers and milestones of success also vary: in **Policy, Politics and Education** the first markers of success can often be impacts, such as the Change4Life case study (REF3), or the Olympic/Paralympic case study (REF2014:REF3), with outputs often following later (REF2 includes outputs from the REF2014 case study). For **Clinical Exercise Science** and **Human Performance**, early milestones tend to be outputs setting out proof-of-concept and feasibility (each visible in REF2), with incremental and substantive impacts planned to follow in later REF periods as efficacy and effectiveness are demonstrated.

### 1.3) Achievement of Strategic Aim and Objectives

Set under an overarching aim to enhance the sustainability and vitality of our three research themes, our objectives set out in REF2014 were to develop and deliver drivers, markers and milestones of success as follows:

- **Drivers of Success**

- Obj1 Capitalise on and further expand external collaborations, particularly for large-scale funded research. (3.1;4.1)
- Obj2 Increase research funding overall and the proportion from research grants by: (a) building on our successful targeted tendering strategy to further grow income from research contracts; (b) developing pro-active grant-capture strategy. (3.1)
- Obj3 Continue to develop ECRs, both: (a) from current ECRs to senior researchers; (b) recruiting and mentoring future ECRs. (2.1)
- Obj4 Further grow PGR numbers and completions, particularly through Instructor, Technician and Research Assistant posts with embedded “half-time” doctoral bursaries. (2.2)

- **Markers and Milestones of Success**

- Obj5 Further enhance research quality by continuing to increase staff time for research, and growing support infrastructure. (2.1;3.2)
- Obj6 Deliver impact by: (a) targeting research towards impactful questions; (b) maximising ownership of the delivery of impact; (c) developing virtuous impact circles through strong relationships with users. (4.1)

### 1.3.1) Development and Delivery of Drivers of Success (Obj1-4)

Collaborations (Obj1) internal and external, pro-actively developed with strategically targeted academics and policy-makers, and reaching across and beyond disciplines have been essential drivers of success in this cycle. Examples have delivered: successive NIHR RfPB grants (Obj2;3.1) for multi-site feasibility studies of isometric exercise in primary care settings; proof-of-concept partnership projects on functional mobility in ageing (STABLE) and disabled populations (MOTION) (Obj2;3.1); increased reach of placebo research into the anti-doping community, preparing the ground for grant-capture (3.1;4.1); reach of perinatal physical activity research into policy and practice (Obj6;REF3), including a £670,000 national intervention with *ukactive* (Obj2;3.1).

External Funding (Obj2) in REF4b has more than doubled to over £1m (3.1). *spear's* targeted tendering strategy has secured and delivered 34 research contracts for 20 funders totalling over £800,000 (>double REF2014), which has driven our programmes on Olympic/Paralympic legacies, physical activity for the least active, and a number of areas of exploratory research (Obj2a;3.1). Our strategic focus on collaborative trans-disciplinary grant-capture (Obj1) has delivered funding of £1m to drive our isometric exercise and functional mobility research (Obj2b;3.1;4.1). We have used consultancy and evaluation contracts totalling £235,000 (3.1) to drive an early-stage coalescence of staff (Obj4) around our authenticity and value in tourism programme. Finally, we have strategically harnessed *SportsLab's* KE and consultancy contracts, totalling £330,000 (3.1), to drive a performance sport environment and infrastructure for placebo research, exploratory research on fatigue/endurance and performance in ageing and disabled populations, and to provide enabling infrastructure for STABLE and MOTION.

Staff Development and Recruitment (Obj3) continues to be facilitated by the consistency of our three research themes, and is a vital strategic driver underpinning our long-term dynamic approach to the establishment and development of each of our research programmes. We have a longitudinal career progression pipeline from doctoral student to ECR, on to mid-career researcher, and finally to established research leader (2.1). All staff have experienced at least part of this progression within the Unit, and this drives an ownership not just of research, but of the longitudinal strategies for its development.

Doctoral Study (Obj4) completions have almost tripled to 24, following strategic investments during REF2014 in both full-time doctoral bursaries, and Instructor, Technician and Research Assistant roles including 'half-time' doctoral bursaries. Together with increased recruitment of externally funded (Obj2) and both domestic and international fee-paying students, our annual average number of registered doctoral students has grown by 26% to 17.5 (REF4a;2.2). Our doctoral students are embedded within, and are an important driver of, specialist research programmes that are consistent, dynamic, longitudinal, collaborative, trans-disciplinary, and engaged with and funded by sector stakeholders and user communities (3.2). This both enhances the Unit's ability to recruit high quality doctoral students (Obj4), and locates them within a career-enhancing environment.

### 1.3.2) *Development and Delivery of Markers and Milestones of Success (Obj5-6)*

Research Quality (Obj5) has been enhanced by increased collaboration (Obj1) and resourced by external funding growth (Obj2). This has increased time and resources to enhance quality, and to progress our research programmes from, for example, field-based, cross-sectional or case studies, to robust behavioural or randomised controlled interventional trials in key target populations. Outputs, including systematic reviews and meta-analyses, have been strategically developed and placed to address medical, scientific and policy audiences (Obj1) and to invite trans-disciplinary debate and support for both our research, and its actual and potential impacts (Obj6). For example, our isometric exercise programme has built collaborations with NHS medical colleagues to enable access to clinical populations (Obj1), and to co-author outputs with and for NHS colleagues in medical journals (Obj5;REF2). This has broadened the audience for the research, validated its quality among the medical community, and stimulated debate about the potential of isometric exercise as an alternative to drug therapy (Obj6;4.1). Similarly, our placebo research programme has strategically placed outputs in the highest profile outlets at the interface of medicine and sport science (Obj5;REF2) to stimulate discussion and build support for placebo-led funding and interventions to support anti-doping and athlete welfare (Obj6). Finally, while outputs from our perinatal physical activity programme have been substantively published (REF2), peer-reviewed Editorials in outlets at the interface of exercise and health have also been strategically developed to target practitioners and policymakers, and support impact (REF3).

Research Impacts (Obj6) have been very successfully delivered by the Unit, with all impacts submitted to REF2014 rated as outstanding or very-considerable. However, many were *transactional impacts*, arising from the immediate application of our research to address issues, programmes or activities that specific policy-makers, practitioners and end-user groups were facing, delivering or undertaking at a particular time. As we have deepened our relationships with our portfolio of research funders and users during this cycle (Obj6c), we have sought to further maximise our ownership of the delivery of impacts (Obj6b) by strategically working across user groups to broker *structural impacts*, in which we deliver long-term evidence-based changes to

policy and practice orthodoxies, delivery systems and ways of thinking for the sustained benefit of successive cohorts of end-users. Our first example of this was our outstanding REF2014 Olympic/Paralympic legacy case study, which changed understanding about how physical activity and sport legacies are achieved, resulting in structural policy changes that benefitted end-users. For this cycle, our impact case studies (REF3) have been chosen to explicitly illustrate our successful strategy to deliver structural impacts: the Change4Life case delivered evidence-based systems changes which shaped national policy, investments and guidance from government departments and agencies, and defined expectations for future school sport provision for the least active; the perinatal case led to new national perinatal physical activity guidelines, and stimulated new professional body training and standards, thus supporting benefits for future generations of health professionals and pregnant and post-partum women. Examples of future milestones of success for our strategy to deliver structural impacts include: the establishment of isometric exercise (and possibly HIIT) as an alternative to drug therapy for hypertension and its inclusion in national physical activity and clinical guidance; a shift from regulation to education in anti-doping policy, using placebo research to educate athletes and coaches about the processes by which doping benefits performance.

#### 1.4) Interdisciplinarity, Integrity and Open Research

The REF2014 Panel C report noted a growth in high-quality issues-led research that was *trans-disciplinary* (not located in any specific discipline or disciplines). Given our commitment to improve the health, wellbeing and welfare of groups not well served by existing provision and policies, issues-led research is as important to our cross-disciplinary approach as interdisciplinarity. All activity described in 1.3 includes examples of trans- or interdisciplinarity, either across UoA24 sub-disciplines, or through strategically building collaborations that reach into other areas of health, medicine, politics, social policy, management and education (4.2). Our explicit strategy is to seek collaborations (Obj1) that improve the quality of our work (Obj5) to improve health, welfare and wellbeing (Obj6) – this transcends disciplines and embeds interdisciplinary approaches (broadly defined) as standard.

Importantly, and without exception, all research in the Unit is undertaken under the auspices of the University's Research and Enterprise Integrity Framework (REF5a), underpinned by a commitment to EDI (2.3). However, our commitment to research integrity goes beyond process, and is driven by our purpose and values, hence our EDI commitment extends beyond staff and students to research beneficiaries. Our values-led commitment to improve the health, wellbeing and welfare of groups not well served by existing provision and policies, demands that we deliver research that is robust, ethical, trusted and relevant to the lives of these groups.

Our values and approach to integrity underpin our commitment to making outputs and outcomes from our research available and open to scrutiny and use as soon as possible. We use pre-print servers (e.g. *medRxiv*, *SocArXiv*, *SportRxiv*), deliver training to staff to use social media and dissemination platforms (e.g. *ResearchGate* and our own *ExpertComment* blog) to provide access and promote discussion and uptake of research, and we always seek to remove any contract clauses that restrict access or provide sustained privileged funder access to findings. We also make use of our Transformative Open Access Agreements (REF5a) to publish open access outputs. Consequently, the Unit is 100% compliant with REF2021 open access requirements via *ResearchSpace*, and with CCCU's Open Access Policy (REF5a), with many more Unit outputs in REF2 and underpinning REF3, plus those not included in the submission, openly accessible.



### 1.5) Future Aims and Objectives

Although our strategy spans REF cycles, it is nimble and dynamic and necessarily continues to evolve to now support a mature Unit that has grown to house an increasing number of distinctive successful specialist research programmes at an increasingly advanced stage of development. Consequently, our objectives for the next REF cycle are to:

#### **A. Develop trans- and inter-disciplinary collaborations to support the onward-stage progression of our research programmes and enhance research quality.**

We will nourish, grow and add to our current collaborations, continuing to reach outside our subjects and disciplines to support the delivery of:

- **Clinical Exercise Science:** large-scale trials of the efficacy and (cost-)effectiveness of isometric exercise in clinical populations; HIIT feasibility studies in 'at risk' populations.
- **Human Performance:** controlled trials of placebo interventions to support anti-doping; training studies to establish feasibility of functional mobility interventions.
- **Policy, Politics and Education:** evaluations of: delivery of social and life skills across multiple sport and/or Olympic/Paralympic interventions; perinatal physical activity advice and experiences; authenticity and social/economic value creation in tourism.

#### **B. Leverage collaborations, increased research quality, advocacy and transactional impacts to deliver sustained structural impacts.**

We will continue to develop and deliver our strategy of building a critical mass of high-quality evidence, engagement, support and transactional impacts to deliver outstanding structural impacts with sustained reach and significance for successive cohorts of end-users, as well as delivering transactional impacts as an end in their own right.

#### **C. Grow a diversified and significant portfolio of research funding sources and types.**

As different funding sources and types support different outcomes (e.g. proof-of-concept, feasibility, effectiveness, transactional or structural impacts) we will increase both the volume and specificity of our income, targeting funding sources and types most appropriate to the research outcomes and impacts sought; this will include seeking funding sources to diversify *SportsLab*'s role from facilitating the research environment, to developing and delivering specialist research programmes in its own right.

#### **D. Enhance our longitudinal career progression pipeline for staff at all stages, but particularly to support the internal development of strategic research leaders.**

We will continue to recruit and develop staff, particularly ECRs, in support of our specialist research programmes, but as our programmes reach mature-stage development we will provide specific strategic research leadership mentoring to senior mid-career staff to develop as strategic leaders of collaborative project portfolios, grant capture and future development strategy.

#### **E. Embed PGR students within funded and user-led research to grow recruitment, registrations and completions.**

We will leverage external funding, stakeholder engagement and impact to increase recruitment to doctoral studies embedded within, contributing to, and benefitting from increasingly mature specialist research programmes.

## 2. People

### 2.1) Staffing Strategy and Staff Development

Our longitudinal staff recruitment and development strategy is a key driver of success for the Unit. We recruit ECRs with research interests aligned to our specialist research programmes or exploratory research areas, and invest in their progression and development to promote staffing stability and retention. As a result, 85% of staff (16.2FTE) have been with the Unit since they were ECRs, a quarter for three REF/RAE cycles.

Supporting a dynamic and vital environment, five ECRs have been recruited in this cycle: three former doctoral students (**DeVivo, Hurst, Taylor**) explicitly retained in our isometric/HIIT, placebo, and perinatal research programmes respectively, plus **Skourtis** (authenticity and value in tourism) and **Williams** (exploratory research in embodied experience of performance in aging populations). **Brighton, Brown** and **Lovell** have developed internally as independent researchers since REF2014. Four of the five ECRs submitted to REF2014 (**Dowse, Foad, Mills, O'Driscoll**) have been retained in the Unit and developed as senior mid-career researchers, leading our early-stage HIIT research programme (**O'Driscoll**) and our impact case studies (**Foad, Mills**), and all attracting industry funding.

Our recruitment and development also emphasises commitment to issues-led research that improves health, wellbeing and welfare for end-user communities. This promotes a dynamic cross-fertilisation of ideas between our three themes and across our specialist research programmes, developing both research and researchers with a trans-disciplinary orientation. **Coleman**, for example, together with **Brown**, have developed our functional mobility research, but both also contribute to **Clinical Exercise Science**. **Foad** leads *spear* in **Policy, Politics and Education**, but also supports placebo research, and **O'Driscoll** works beyond **Clinical Exercise Science** to contribute to perinatal physical activity research. Planned future trans-disciplinary collaborations include between **Hurst, O'Driscoll** and **Wiles** to explore placebo applications in **Clinical Exercise Science**, between **Brighton, Brown, Foad, Coleman** and **Weed** to explore synergies across research with disabled and SEN populations, between **O'Driscoll, Wiles** and **Weed** to explore the potential role of isometric exercise in physical activity guidelines and policy, and between **Brighton, Chatziefstathiou, Hurst** and **Uphill** on athlete safeguarding.

The Unit's staffing strategy extends the Concordat to Support the Career Development of Researchers (REF5a) to all staff with SRIR. Our longitudinal commitment to our three research themes, our specialist research programmes, and support for exploratory research, creates a positive and stable *environment and culture* for staff to develop research and achieve their full potential. Promotions of former ECRs **Dowse** (Principal Lecturer), **O'Driscoll** and **Mills** (Reader) and **Foad** (*spear* Research Director), and their progression as senior mid-career researchers, are examples of this. Our consistent and sustained provision of regular research time for all staff (we maximise regular research time rather than provide study leaves), our support for ECRs with mentoring support and lighter teaching loads in their first 18 months, and additional release of time for externally funded research or specific objectives, creates a positive and enabling *employment* context. For example, both **Wiles** and **Lovell** have been released from former teaching programme director responsibilities: **Wiles** to develop funding collaborations for isometric exercise, leading to NIHR RfPB funding (3.1); **Lovell** to complete a monograph on authenticity

(REF2:U24.027). Finally, we actively support continuing *professional and career development*: e.g, the SPARC (Supporting Progression in Academic Research Careers) programme (REF5a) has been made available to all ECRs, and all staff in the Unit participate in annual research and career development planning discussions with their line manager. We therefore recognise and reward staff through a mix of formal and informal approaches across promotion and progression, time and resources, and career development support.

A Head of School vacancy enabled recruitment of an experienced senior research leader (**Edwards**) to provide support and mentoring across laboratory-based research, while **Roelands** was specifically recruited from the Unit's existing international network to mentor placebo research (4.2). Despite promotion to Pro Vice-Chancellor (Research & Enterprise), **Weed** continues to provide mentorship across **Policy, Politics and Education**, with *spear*, and for impact and impact case studies. We have also appointed Visiting Professors to mentor colleagues in **Clinical Exercise Science** (Raj Sharma, St George's, London), **Human Performance** (David Pyne, Canberra; Remco Polman, Queensland) and **Policy, Politics and Education** (Ian Henry, Loughborough). However, as our specialist research programmes reach increasingly mature-stage development, our future priority is to provide specific strategic research leadership mentoring to support our senior mid-career staff to move beyond individual project leadership to develop as strategic leaders of collaborative project portfolios, grant capture and future development strategy.

We have harnessed commissioned user-led research, consultancy and knowledge exchange, particularly that delivered by *spear*, *SportsLab* and in tourism, to provide the context and mechanisms for staff to make strategic links with a wide range of sector and industry stakeholders, and to support outputs, our impact case studies (REF3), and our wider impact and relationships with the sector (4.1). All staff have worked on projects funded by industry partners in at least one of these contexts, with examples including Ultromics Cardiovascular Imaging, Kent Cricket, UK Anti-Doping, Premiership Rugby, UKinbound and Turner Contemporary.

## 2.2) Research Students

We recruit students to internally-funded bursaried doctoral studies, to Instructor, Technician and Research Assistant posts with embedded 'half-time' bursaries, to externally-funded studies, and as fee-paying students. Strategic internal investments and externally-funded collaborations that delivered a three-fold increase in registrations for REF2014 have delivered a matching increase in completions (from 9 to 24) during REF2021 (REF4a), during which we have also increased recruitment to further grow FTE registrations by 26% to an average of 17.5 per annum.

Doctoral students are embedded within one of our specialist research programmes, or exploratory research areas, and are supported by both their formal supervisors (REF5a) and the wider research team. As all three of our research themes are underpinned by collaborations across disciplines and with industry and sector partners and funders, doctoral students work in a vibrant performance sport, industry or policy-led environment, which drives recruitment. This environment, supported and enhanced by *spear*, *SportsLab*, tourism consultancy work, and our capital investments (3.2), provides doctoral students with career-enhancing interactions with both research-user organisations and end-user communities, as well as developing important skillsets in laboratory, field, practitioner or policy-led research that extend and enhance the methodologies



and skills developed through the Graduate College's formal researcher training programme (REF5a).

Much of our external funding for doctoral study comes from our research-user partners, through either directly funding studies (e.g. Chartered Institute of Physiotherapy, Department of Health, Musculoskeletal Association of Chartered Physiotherapists, Ultromics Cardiovascular Imaging), or indirectly through our strategic use of our portfolio of commissioned research funding to establish Research Assistant posts in *spear*, and consultancy funding to establish Technician-Researcher posts in *SportsLab*, each with embedded half-time bursaries. A future priority is to embed more doctoral funding within our grant capture strategies.

Internal investment in innovative Instructor and Technician posts with embedded half-time doctoral bursaries, enhances the Unit's research environment by releasing research time for staff and providing technical resources, and by providing students with important supplementary training and experience in HE teaching or technical services. In addition, we have developed and grown a successful Masters by Research programme, which provides opportunities to try a research degree without committing to 3-5 years of study, and acts as talent pipeline to doctoral study. Like doctoral students, Masters by Research students are fully integrated into our research environment and embedded within our specialist research programmes.

Funding for research consumables, research expenses and for external academic engagement and dissemination (e.g. at conferences) is provided for all internally and externally funded research students (~£800pa), whilst their embedment within our research themes means they are an integral part of internal research seminar programmes, which include both external speakers and opportunities to present developing work. Our whole University integrated approach to wellbeing (REF5a) provides the same wellbeing services and support available to staff to research students. All doctoral students have access to dedicated desk and IT facilities, and progression and training needs are monitored through to completion via *ResearchSpace* (REF5a). That our increase in doctoral completions in REF2021 matches our increase in registrations in REF2014. is clear evidence of our ability to support students to successful completion.

### 2.3) Equality and Diversity

The Unit is committed to upholding and promoting equality objectives and external commitments, such as to the Race Equality Charter and as a Disability Confident Employer (REF5a), as well as supporting the University's integrated approach to staff and student wellbeing. The Unit was part of the first School Athena SWAN Bronze Award made to CCCU, and senior staff in the Unit (e.g. **Chatziefstathiou, Coleman**) are members of the combined implementation and self-assessment group, chaired by **Edwards** (as Head of School), responsible for both delivering Bronze Award commitments and developing CCCU's first Silver Award application in 2022.

The Unit sits within the Faculty of Science, Engineering & Social Sciences, for which data from the provisional institutional equality impact assessment (REF5a) shows that the gender balance, age, ethnicity and contract status of staff with SRIR are more closely aligned with the overall staff profile than for REF2014. At Unit level, 90% of staff in REF1 are on permanent contracts, 90% are full-time, 63% are male, 50% of part-time staff are male, and 40% of staff promoted during the period are male. Half of the UoA Steering Group are female, including the Director of Research Environment (**Chatziefstathiou**), the *spear* Research Director (**Foad**) and both Impact Case

Study Leads (**Foad, Mills**), two of whom (**Chatziefstathiou, Mills**), along with ECR **Taylor**, have been supported to return from maternity leave to take up leadership roles.

The explicit implementation of the Concordat to Support the Career Development of Researchers (2.1), the gender balance of staff in leadership roles, the longitudinal support for ECRs (2.1), and the embedment of research students in specialist research programmes and wellbeing activities (2.2) is part of the Unit's commitment to nurture an inclusive research environment. This supports the longitudinal career progression of research students and staff, providing equal access to funding support, training and development, promotional opportunities, leadership roles and inclusion in REF, regardless of gender, disability, working pattern or life events.

### 3. Income, infrastructure and facilities

#### 3.1) Income

Research income has more than doubled from under £500k in REF2014 to over £1m in REF4b, with more than £600k already contracted for the future. In addition, the Unit secured £1.4m not shown in REF4b, including funds held by internal (e.g. UoA3) and external (e.g. *ukactive*) partners, transferred to other HEIs when staff members left, or for KE and consultancy. Total income secured by, or supporting the work of, the Unit therefore exceeds £3m.

Our income strategy is to establish how, when and what funding sources will be drivers of success for strategic long-term goals, user-needs and expected outcomes for our specialist research programmes. Different programmes will both need and have potential to secure different funding sources to support different goals and markers of success (1.3.2) at different stages in their development. This is reflected in approaches and successes below, as well as in income distribution across ALL our specialist research programmes and our three themes, which represents significant progress from more concentrated funding in REF2014.

*spear* has delivered 34 projects for 20 funders totalling £811,460, all awarded by competitive tender, which doubles income returned for **Policy, Politics and Education**. Eight funders have commissioned multiple projects, including Department of Health, Youth Sport Trust, Sport England and MenCap, reflecting significant strategic relationship building, and supporting our impact model (4.1). *spear's* strategy is to selectively target its tendering at contracts that contribute to our research programmes and exploratory research set out in 1.2. This delivers immediate transactional impacts for practitioners and end-users who benefit from findings from individual contracts, but more importantly *spear* strategically links and builds insights across projects and funders over time to deliver sustained structural impacts through systems change (REF3;1.3;4.1). The evidence base generated by this pan-project approach also contributes to important policy critiques (REF2:U24.007;U24.090). In addition to future income already contracted (supporting exploratory work on life skills and mental health outcomes, particularly in the post-COVID-19 context, and for disabled populations), *spear* will capitalise on experience developing sector-leading evaluation methodologies (particularly behavioural controlled trials: REF3), alongside insights from policy critiques and its wider evidence-base, to enable grant-capture relating to policy and behavioural change mechanisms across sport and physical activity contexts and populations. Work will also continue, delivering and evaluating perinatal physical activity interventions, through our £670,000 collaboration spanning REF cycles with *ukactive* (currently £71k in REF4b).

Strategic collaborations have been the cornerstone of our grant capture strategy across **Clinical Exercise Science** and **Human Performance**, which totals £1m. We have leveraged the distinctiveness and quality of outputs from linked doctoral studies (reported in REF2014), which established proof-of-concept that isometric exercise prevents and moderates chronic conditions and improves functional capacity, to build collaborations to secure successive NIHR RfPB funding in 2014 (£340,000) and 2019 (£272,000) for multi-site feasibility studies. While the former subsequently transferred to another HEI when the staff member left, output collaborations (REF2:U24.004) continue. Both projects expand and progress research into primary care settings in partnership with NHS Trusts, clinical commissioning groups, and colleagues in UoA3 and partner HEIs, and support outputs co-authored with (and for) clinicians in medical journals (e.g. REF2:U24.015). The 2019 project has been delayed by COVID-19, and so shows only £22k in REF4b, but NIHR awarded an additional £100k in 2021 to secure outcomes, following the achievement of which funding will be sought for large-scale randomised interventional trials. Funded projects drawing on gait analysis within our functional mobility research programme that explore falls in older haemophiliacs (STABLE, awarded 2014), and evaluate exoskeletons for children with cerebral palsy (MOTION, awarded 2018), have also been secured through strategic collaboration with NHS partners, with the latter being an ongoing EU funded £3.8m collaboration with 15 industry and academic partners across 4 countries (£405k supports CCCU element). Led by UoA3 colleagues (which is where income is returned), this proof-of-concept study is intended, if successful, to be the precursor to training studies to establish the feasibility of achieving sustained mobility improvements.

Recognising the diversity of funding that drives the markers of success (impact and output quality) identified in 1.3.2, commissioned contracts and consultancy totalling £235k (£142k in REF4b) have supported work in tourism building relationships with industry (e.g. Visit Kent, Turner Contemporary) and sector (e.g. UKinbound, Arts Council, Heritage Lottery Fund) partners, delivering impact on regional tourism strategy and economic development (4.1), and underpinning outputs (e.g. REF2:U24.077). We have used collaborations on and across this funded work, to strategically drive a coalescence of interest among previously unconnected staff to establish authenticity and value in tourism as an early-stage research programme, with further strategic growth of staff with SRIR planned.

Finally, through delivering KE and consultancy contracts totalling £335k for professional, elite, recreational and industry-led performance sport clients (e.g. Saracens Rugby, UK Anti-Doping, Sport England, Marathon Sports), we have strategically harnessed *SportsLab* to deliver a core part of our infrastructure: a vibrant and thriving performance sport environment. Despite only £24k being returnable in REF4b, the human and physical resource this funding provides supports growth in technical expertise (3.2), aids doctoral recruitment and progression by providing career enhancing experience and bursary funding (2.2), and supports access to research participants and delivery of laboratory-based research. Recent interventional studies and RCTs on placebo effects, mental and physical endurance and fatigue, and exploratory research on performance experiences in disabled populations (e.g. REF2:U24.089;U24.006;U24.053), as well as talented athlete scholarships evaluations and STABLE and MOTION, have all been enabled by *SportsLab*'s networks and infrastructure. Our new Verena Holmes STEM Building will physically host *SportsLab* from 2021, and co-locate the Unit with Kent and Medway Medical School (KMMS) and our Engineering, Design Growth and Enterprise (EDGE) Hub (REF5a). This, together with current grant applications to the ESRC and World Anti-Doping Agency (WADA) for placebo work, and evolving critical mass around exploratory work on endurance/fatigue and disabled/ageing

populations, supports future strategy to seek funding to diversify *SportsLab*'s role from facilitating the research environment to developing and delivering specialist research programmes in its own right.

### 3.2) Infrastructure and Facilities

The University has strategically invested £12.9m in the Unit through capital infrastructure (£9m), capital equipment (£1.5m) and revenue (£2.4m, including governance) funding to support the work of the Unit over the REF2021 cycle. The Unit's impact and sustained high-quality, longitudinal performance across multiple REF/RAE cycles has been a key part of the vision that has attracted [£26m] of external public, private and charitable investment in the University's STEM provision during the cycle (REF5a).

**Capital Infrastructure:** the University's £65m investment in the Verena Homes STEM building (REF5a), includes £9m infrastructure investment in the Unit, including a dedicated bespoke suite of laboratories hosting *SportsLab* and specialist research programmes within **Clinical Exercise Science** and **Human Performance**, increasing laboratory provision by 50% to almost 800sqm. However, the strategic co-location with STEM (KMMS, EDGE Hub, UoA3, UoA5) and STEM-related (UoA4, UoA18) disciplines, including clinical and manufacturing spaces and equipment, biological and molecular laboratories, and observation and simulation facilities, will drive further trans-disciplinary collaborations across units. Planned new collaborations include with: KMMS and UoA3 for isometric exercise and HIIT in clinical populations, and health applications of placebo effects; EDGE Hub for translational technology development for clinical exercise applications and functional mobility, as well as sports technology; UoA4 and UoA5 for behavioural, neurological and molecular aspects of placebo effects and exercise engagement.

**Capital Equipment:** £1.5m has been invested to support onward-stage progression of specialist research programmes and some aspects of exploratory research. For example: **Human Performance** work on placebo and endurance/fatigue has been supported with a state-of-the-art environmental chamber to simulate extreme environments; new eye-tracker technology supports functional mobility research; investment in doppler ultrasound allows clinical measurements of vascular responses to HIIT and isometric exercise; portable gas analysis and SRM cycle technology has enhanced ecological validity of both *SportsLab* services and exploratory endurance/fatigue field research. This, together with *SportsLab*'s KE and consultancy activity, contributes considerably to a dynamic and buoyant environment in which performance and health applications and practice of exercise and sport interface with cutting-edge technologies, research outcomes and impact.

**Revenue Investment:** average annual revenue funding to the Unit, supporting research, research leadership and research governance time, consumables and expenses, dissemination and engagement activity, Technician and administrative support, research assistance, and doctoral bursaries, exceeds £300k. The Director of Research Environment (**Chatziefstathiou**) consults staff and the Unit's Steering Group to identify strategic resource requirements at the Unit, theme and research programme level, and liaises with the Head of School (**Edwards**), and Faculty Research Director to ensure these are surfaced during annual Research and Enterprise Quality Improvement and Enhancement (REQIE) (REF5a) which informs annual business and financial planning. Revenue investments over the period include: Technician, Technician researcher, Instructor and Research assistant posts (2.2); annual support (time and expenses) for all staff to

disseminate and engage external colleagues, collaborators and stakeholders with their work and its impact at conferences and industry/sector meetings (4.1;4.2); time for impact development activity with stakeholders over the full research lifecycle (4.1); direct research consumables and expenses; time and expenses in support of internal and external collaboration (4.2), training and insight sharing to support income generation and grant capture (3.1), including time to pro-actively engage with our Research and Innovation Funding Unit (RIFU) (REF5a).

**Governance:** the Unit Steering Group is co-chaired by the Director of Research Environment (**Chatziefstathiou**) and the Head of School (**Edwards**); has designated 'Champions' for impact, public engagement, funding and researcher development; was responsible for output and impact case study selection in accordance with the Institutional REF Code of Practice; advises on distribution of RESF funding (REF5a); and reports to the School Strategic Leadership Team, the Main Panel C Co-ordinating Group and the Institutional REF Steering Group.

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

##### 4.1) Relationships with Research Users and the Delivery of Impact

REF4b includes formal funding relationships with 35 research user organisations across 48 projects. A significantly larger number benefit as 'secondary users', with more still strategically engaged to support and develop our research programmes. We build relationships before, during and after our research to maximise ownership of the delivery of impact, recognising that this will drive future structural impacts to deliver sustained improvements to the health, wellbeing and welfare of our wide ranging and diverse end-user communities, including those vulnerable and with health conditions, pregnant and post-partum women, older age groups, disabled and SEN groups with diverse and intersectional class, race and gender identities, and those experiencing place-based economic, social or cultural exclusion. We engage with these communities directly, through consultation, and their participation and involvement in our research, and indirectly through research user organisations. To enable this, our specialist research programmes specify long-term markers and interim milestones of success for end-user impact, which determines strategy for engaging and interacting with research user organisations and end-user communities as our programmes develop.

A long-term success marker for **Clinical Exercise Science** is to benefit those with or at risk of hypertension or poor cardiac health by evidencing isometric exercise and HIIT as effective and cost-efficient alternatives to drug therapy. To this end, we have pro-actively engaged with NHS Trusts (e.g. Maidstone and Tunbridge Wells & East Kent Foundation Trusts), clinical commissioning groups (e.g. Canterbury and Coastal CCG), clinicians (e.g. at Kent and Canterbury & London St George's Hospitals) and public and patient user groups (e.g. 'Research Friends'; 'Open Doors') through funded research, co-authorship and PPI panels, to achieve an interim milestone of success: to build an engaged community of research users collaborating in our research and advocating for its impact. **Human Performance** has followed a similar strategy for placebo research, building a supportive international coalition of research users across government (e.g. US Department of Veterans Affairs), sport governing bodies (e.g. UK Athletics), and anti-doping (e.g. UK Anti-Doping) as an interim milestone towards the longer-term success marker to inform development and delivery of anti-doping interventions focused on athlete welfare and education, rather than regulation and punitive sanctions. Our functional mobility programme strategically embeds relationships with health sector users: Kent Haemophilia Centre and East



Kent University Hospitals NHS Trust are collaborating partners for STABLE; EU health users for MOTION include Sint Maartenskliniek (Netherlands) and Pulderbos Children's Rehabilitation Centre (Belgium). However, a milestone of success for MOTION is to demonstrate proof-of-concept to harness industry manufacturers as future collaborative partners, hence the strategy to include industry-research translation specialists CENTEXBEL (Belgium) and CEA-Tech (France) in the collaboration.

**Clinical Exercise Science** and **Human Performance** show process impacts and outcomes for participating end-users, including lowered and more stable blood pressure among pre-clinical hypertensives, reduced falls risk among elderly patients attending Kent Haemophilia Centre, and improved mobility for children with cerebral palsy in MOTION. There are also transactional impacts from **Human Performance**, including: providing evidence to the Australian Institute of Sport on the contexts and appropriate circumstances in which fatigue can be moderated by cryotherapy (cold baths) to inform guidance to athletes and coaches; incorporating placebo evidence into UK Athletics' *Clean Sport Interventions*, to the (self-reported) benefit of over 500 elite and performance pathway athletes. However, a primary purpose of our impact strategy at this stage is to shift perceptions about policy and practice orthodoxies, and to nurture a receptive climate for future evidence to support longer-term structural impacts.

Across **Policy, Politics and Education** the pro-active development of long-term relationships with our portfolio of research user organisations is a vital part of our strategy for delivering both transactional impacts from specific projects and longer-term structural impacts. Relationships begin with smaller or pilot research, with milestones of success to deliver transactional impacts for end-users and practitioners through programme improvements. This builds relationships, which we deepen further with repeat delivery of larger and often linked projects, or broaden as new primary relationships develop with 'secondary users'. For example, we engaged MenCap with our Paralympics research for Sainsbury's and the Youth Sport Trust (YST), following which, they directly commissioned pilot research which revealed sport initiatives unexpectedly impacted employment outcomes for those with learning disabilities: outcomes which are now designed into the programme's main roll-out, benefitting 4,000+ people with learning disabilities at ~80 UK locations. Similarly, we connected *parkrun* with our research for YST and Department of Health quantifying health impacts, leading to an invitation to **Weed** to join its Global Research Board, which led to a commission for an evidence review of outdoor COVID-19 transmission, which informed *parkrun*'s post-pandemic re-opening decisions and delivery protocols across 2,100+ events in 22 countries benefitting ~7million parkrunners. The work also featured in debates in national print and broadcast media in UK, USA and Ireland about outdoor event safety, delivery of sport and activity for physical and mental health during Autumn 2020 lockdowns, and in Public Health England's December 2020 advice on COVID-19 risks. Our strategic sharing of previous work on the impact of the Olympics on young people, development and sport coaching led: (i) Terres des Hommes to commission an evidence review on mega-events and children's welfare; (ii) Peace and Sport to commission a report on the achievement of the Sustainable Development Goals through sport; (iii) UK Sport to commission research on informal coach education. Impacts comprised: (i) the development of Terres Des Hommes' campaigns supporting vulnerable Brazilian children before, during and after Rio2016; (ii) girls participation opportunities and measures to safeguard from crime included in 7 programmes across 25 developing countries benefitting ~385,000 young people per annum; (iii) the development of an informal coach education model adopted by UK Sport for work with Official Development Assistance (ODA) countries. Finally, we leveraged previous work with VisitKent to successfully secure funding from

the Arts Council for England and VisitEngland to understand regional cultural destinations, which led to the development of a new partnership model across tourism and cultural organisations, *Culture Kent*, to deliver economic and social benefits to the regional economy.

We have used multiple larger or linked projects delivered over more than a decade spanning REF cycles, to develop deep and longstanding relationships with key research user organisations, such as YST, Sport England, *ukactive*, Mencap and the Departments for Education and Health and Social Care. We strategically seek to evolve these relationships beyond contractor-client, to trusted partner and advisor, enabling us to broker relationships across and between research user organisations to achieve our long-term success marker: to deliver evidence-based systems change for the sustained benefit of successive cohorts of end-users spanning projects, programmes and funders. These long-term markers of success have been delivered for physical activity and sport for the least active (REF3), Olympic/Paralympic legacies (REF2014:REF3), and perinatal physical activity (REF3), to the benefit of health and education professionals, whose practice and delivery is improved, and current and future generations of end-users, including the least active, socially and culturally excluded communities, and pregnant and post-partum women.

#### 4.2) Academic Collaborations, Networks and Interdisciplinarity

Our strategic development of collaborations is a driver of success for both the milestones and markers of impact described above, and for increased research quality (1.3). We have pro-actively developed co-authorship: three-quarters of REF2 outputs collectively include 53 co-authors from 38 other HEIs, including 20 international authors. This significant volume of collaborative activity and outputs derives from strategies to: continue collaboration between ECRs and former PhD supervisors; build relationships through funded research; develop networks to enhance interdisciplinarity; facilitate partnerships to develop and scale-up impact. These strategic collaborations are driven by an issues-led focus on the primacy of the research questions and benefits to end-users, and as such they necessarily reach across and beyond subject, disciplinary and methodological boundaries to integrate quantitative and qualitative designs, scientific, social-scientific and humanities concepts and theories, and insights from, *inter-alia* sport, health, medicine, education, politics, management, culture and tourism as part of our *trans-disciplinary* approach to research (1.4;2.1).

Illustrative international trans-disciplinary networks, that we have strategically developed to deliver markers and milestones of success for quality outputs and impacts include: a ten-centre collaboration, including colleagues in Australia, Canada, USA, Brazil, Belgium and UK to develop a landmark meta-analysis of the impact of isometric exercise on resting blood pressure (REF2:U24.004); an international academic advisory panel from USA, Canada, Australia and Germany supporting a Department of Health funded systematic review on Olympic sport participation legacies (REF2:U24.035); and an international network of placebo and anti-doping researchers across Netherlands, Belgium, USA, Greece and UK realising multiple publications, including a cross-country cluster randomised controlled trial of an anti-doping intervention (REF2:U24.006;U24.085), and facilitating the appointment of **Roelands** (2.1). Illustrative longstanding and continuing relationships, strategically developed across multiple projects and outputs in both specialist research programmes and exploratory research, include **O'Driscoll's** collaborations with Sharma (St George's University) on Cardiac Health (REF2:U24.018;U24.023;U24.086), **Brighton's** work with Sparkes (Leeds Beckett University) on embodied experiences of performance in disabled populations (REF2:U24.053;U24.087),

**Edwards'** research with Deakin (James Cook University) on endurance and fatigue (REF2:U24.024;U24.028), and **Butcher's** work with Smith (University of West London) on the social value of volunteer tourism (REF2: U24.091).

#### 4.3) Influence, Recognition and Contribution to Sustainability

The Unit's contribution to the sustainability of research in sport and exercise science, leisure and tourism studies derives from our continuity and longitudinal commitment to our three research themes, our distinctive and dynamic specialist research programmes, and to supporting exploratory areas of related research (1.2). This is driven by our sustained strategic collaborations, our longitudinal partnerships with research users and funders, and our support for and the stability of our staffing base (1.3.1). It has allowed us to make leading and enduring contributions to the research base in the areas of our specialist research programmes, and to contribute to international debates among both research users and the academic community about the development of these specialist areas of research. Further illustrative indicators of this influence beyond that widely evidenced in REF2;REF3;1.3.1;3.1;4.1;4.2 include:

- 23 Editorial Board Memberships, including Editor-in-Chief of the *Journal of Sport & Tourism* (**Weed**), Senior Editor of *Cogent Social Sciences* (**Chatziefstathiou**), Associate Editors of *International Journal of Sports Physiology & Performance* (**Roelands**), *Performance Enhancement & Health* (**Hurst**).
- Journal Reviewing: all UoA members review for the main journals in their fields (~100+), but many also review for mainstream disciplinary journals such as *The Lancet*, *BMJ*, and *Circulation*.
- Grant Reviewing includes all relevant UK research councils and charities (e.g. *Economic and Social Research Council*, *Medical Research Council*, *Leverhulme Trust*), international research councils (e.g. *l'Agence Nationale de la Recherche*, France, *Academy of Finland*, *Research Grants Council of Hong Kong*), and sector funders (e.g. *British Heart Foundation*, *International Olympic Committee*, *National Institute for Health Research*).
- 50+ Academic Keynote and Invited Presentations, including keynotes at *European College of Sport Science* (2019;2020), *European Association of Sport Management* (2016;2018), *British Association of Sport & Exercise Sciences* (2016;2019), *Sport & EU* (2017).
- Hosted 12 International Conferences and Symposia, including: *International Symposium on Placebo Effects*, 2017 (leading to a peer-reviewed international consensus statement); *International Roundtable on Perinatal Physical Activity*, 2018 (leading to the founding of the Active Pregnancy Foundation); *Association for Tourism and Leisure Studies (ATLAS) Annual International Conference*, 2016 (leading to two guest-edited peer-reviewed journal issues on *Cultural Tourism* and *Volunteer Tourism*).
- Service, Fellowships and Prizes include: UK Chief Medical Officers' Physical Activity Communication Committee (**DeVivo, Mills**); *European Association of Sport Management Scientific Committee* (**Weed**); *International Pierre de Coubertin Committee* (**Chatziefstathiou**); Hon Secretary of *British Psychological Society Division of Sport & Exercise Psychology* (**Uphill**); Fellowships of *European College of Sport Sciences* (**Edwards, Roelands**) and *British Association of Sport & Exercise Sciences* (**Edwards**); *NIHR CRN Cardiac Research Award* (**O'Driscoll**), Outstanding Keynote Speaker, *Global Conference on Sport for Social Change* (**Chatziefstathiou**).