

Institution: Loughborough University
Unit of Assessment: A2 Public Health, Health Services and Primary Care
<p>1. Unit context and structure, research and impact strategy</p> <p>Overview</p> <p>Public health and health services research at Loughborough University (LU) has its origins in our established sport and physical activity research, enhanced by a decade of sustained strategic investment in lifestyle medicine and global health. In REF2014, nascent public health research was returned to UoA26 sport, leisure and tourism but the establishment of critical mass and increasing international recognition means the time is now right for this research activity to make its first return to UoA2.</p> <p>The catalyst for the Unit was the creation of the National Centre for Sport and Exercise Medicine (NCSEM) in 2012 - an Olympic legacy project to improve the nation's health via increased physical activity (DHSC, £10m, 2012-2014 and HEFCE Catalyst, £7m, 2013-2018). This was followed (2017) by an £11.6m award from NIHR to establish a Biomedical Research Centre (BRC) to drive clinical and applied research in physical activity and diet, as part of a consortium with Leicester Hospitals and University of Leicester. With a further £6.5m university investment in capital plus additional funding for staffing (doubling the Unit volume), from ECRs to experienced leaders, LU has now established a vibrant new activity delivering high quality and impactful lifestyle and health research nationally and globally.</p> <p>1.1 Research structure</p> <p>The Unit comprises 11 staff (10.7FTE), all from the School of Sport, Exercise and Health Sciences (SSEHS), which has ranked number one in the world for sport-related subjects for 4 years (QS, 2017-20). SSEHS is one of nine Loughborough Schools, each led by a Dean, who leads Associate Deans for Research (ADR), Enterprise (ADE) and Teaching and an Operations Manager on the Senior Leadership Team (SLT).</p> <p>The School's research is organised into three areas: 1) Lifestyle for Health and Wellbeing, 2) Sport Performance, and 3) Participation in Sport and Exercise, each with an academic lead reporting to the ADR. This Unit's staff are all aligned to Lifestyle for Health and Wellbeing; driving the NCSEM-East Midlands research excellence priority to optimise health and wellbeing through lifestyle, physical activity and nutrition, and leading the Loughborough/Leicester BRC's Lifestyle theme.</p> <p>The Unit has built on the School's expertise and longstanding reputation in physical activity to shape its research on societal priorities surrounding lifestyle for health and wellbeing, while pioneering the UK's exercise as medicine agenda. The Unit's research themes respond to societal concerns about increasingly inactive and sedentary populations consuming more energy-dense nutrient-poor diets with associated risks for obesity and non-communicable diseases (NCDs). Our expertise in lifestyle medicine is complemented by disciplinary expertise spanning epidemiology, anthropology, physiology, psychology, nutrition, public health, and global health. Our impact is at the heart of UN Sustainable Development Goal 3 to promote wellbeing for all and specifically to reduce NCD premature mortality by one third by 2030 through prevention and treatment and promoting health and wellbeing, as well as the WHO (2018) target to reduce physical inactivity globally by a relative 15% by 2030.</p> <p>The Unit has two Themes, each with regional foci on the UK and the Global South:</p> <p>i. Lifestyle medicine examines the effectiveness and implementation of community (including school / workplace) and clinical (primary / secondary care) lifestyle interventions to improve health. Catalysed by the NCSEM and the BRC, our national work develops, evaluates and</p>

implements innovative 'cutting-edge' nutrition and physical activity interventions and policies to prevent and treat NCDs across the lifespan. In the global South, the focus is on understanding the drivers of poor health, with a significant focus on producing evidence for efficacy and effectiveness of community-based nutrition interventions for lactating women, infants and young children.

ii. Epidemiology and population health covers life course epidemiology research, predominantly using data from birth cohort studies and in collaboration with the Cohort and Longitudinal Studies Enhancement Resources (CLOSER) initiative. This research utilises longitudinal data from cohorts born at different points in time, allowing investigation of secular trends in life course processes (e.g., obesity development) and relationships (e.g., lifestyle, ethnic and socioeconomic inequalities).

To deliver under these Themes, the Unit organises funding, training and collaboration opportunities through the NCSEM (all staff), BRC (Sherar, Munir, Paine, Costa, Daley) and the newly launched (2020) Centre for Lifestyle Medicine and Behaviour (CLiMB – Daley, Sherar, Paine, Costa). We benefit from collaborations with clinical, policy and public health networks across the Midlands (Midlands Engine, East/West Midlands ARCs), UK (Public Health England) and globally (UNICEF, African Institute for Development Policy) enabling the Unit's research impact.

Unit staff engage in **interdisciplinary collaborations** via the university's CALIBRE (Collective Ambition at Loughborough for Building Research Excellence) framework, specifically through the Global Research Challenge in Health and Wellbeing (HWB, Griffiths leads) and the Sport and Exercise Beacon (Sherar co-leads). Beacons and Global Challenges facilitate interdisciplinary collaboration across Schools to address major and emerging societal issues. As the driving force behind the HWB Global Challenge, the Unit has developed a programme of interdisciplinary global health research, working with geographers, civil engineers, anthropologists, ergonomists, systems experts, photographers, paediatricians, and digital designers. Internal support has leveraged external funding to drive our global health work; for example, extreme climate events and their influence on health service provision in Ghana's poor urban areas (British Academy, £300k, 2017-2019 - with geographers, engineers, and social scientists).

1.2 Review of the submitting unit's objectives and research plans described in REF 2014

The Unit builds on the plans set out in the UoA26 REF2014 environment statement to:

- address contemporary and emerging challenges
- increase knowledge through internationally excellent research

Specific public health research aims were to:

- grow strategic partnerships,
- secure funding to achieve our aims
- nurture excellence through skills development and fellowship support.

In 2014 we were clear that our strengths and strategic priorities, highlighted by the NCSEM award, were around physical activity, nutrition and health. The university's strategy to identify and focus on institutional **strengths** and to target **excellence** in priority research areas led to the HWB Challenge formation (2015). This created the ideal environment in which to initiate a public health research programme, focusing on lifestyle in the prevention and management of NCDs that would naturally return in UoA2. We made collaborations across disciplines and organisations routine in our activities.

Since 2014, the Unit has addressed **contemporary and emerging challenges** associated with rising NCDs. The epidemiology and population health Theme produced research on socioeconomic inequalities showing how disadvantaged children in the UK are more likely to be obese in adulthood and how a transitioning socio-economic position from relatively low to higher levels was not protective against NCD risk in South Africa. Our lifestyle medicine Theme also

addressed **emerging challenges** such as understanding the consequences of COVID-19 lockdown restrictions on physical activity (Paine, institutional seed-corn funding) and constraints to infant feeding and infant health services during COVID-19 in Peru. Rapid dissemination has already led to discussions with Peru's Ministry of Health and other stakeholders about the development of technology driven (e.g., SMS and interactive Apps) infant feeding health messaging to facilitate remote health service delivery.

We **secured competitive funding** to reach our aim to **increase knowledge through internationally excellent research**. Accelerated by a recent NIHR Research Professorship award to Daley (£1.82m, 2019-2024), in part to develop the CLiMB centre, the Unit obtained funding to undertake interventions to increase physical activity in (i) sedentary populations recruited via primary care (e.g. Daley, Sherar NIHR programme grant 2019-2024, £2.2 million on 'activity snacking'); (ii) the general population (e.g. Daley NIHR Professorship, PACE intervention-behaviour change via communicating activity required to expend a food/drink item); (iii) in the workplace (e.g. Munir, NIHR, £892k 2018-2021) and (iv) in schools (e.g. Sherar, CLAHRC-EM £250k 2015-2018 Active Lessons; Haycraft, British Heart Foundation, £182k 2013-2017 reducing screen time and associated poor diet).

This research collectively showed the importance of embedding health behaviour change interventions into routine settings (e.g., NHS consultations and school lessons). Our research in schools evidenced methods to overcome institutional, teacher and pupil level barriers to active lessons which were translated into the successful national BBC/Premier League Supermovers programme.

In global health, significant development awards supported networking with end users leading to new funding for world class global health research (see section 4.1 for awards). This global health work highlighted systems challenges to delivery of infant health programmes including payment of local health workers, a lack of technology-based communication, and a need for integration of health services with nutrition sensitive strategies.

In January 2020, as part of a planned University-led programme of **International Expert Reviews**, we invited a Panel comprising distinguished academics from four world-class universities (Birmingham, UK; Ohio State, USA; Toronto, Canada; Queensland, Australia) to SSEHS. We refer to their findings at various points.

1.3 Enabling and facilitating research impact

The Unit's impact aims from REF2014 UoA26 3a statement were to:

- maintain the prioritisation of impactful research,
- provide funding, and dedicated developmental support,
- build relationships with patient and community groups.

The Unit has succeeded in retaining its culture of producing '**research with impact**', employing its own **development support** reinforced by specialists in the Research and Enterprise Office (REO) to shape its knowledge exchange and partnership activities. For example, NCSEM translational scientists enhance impact delivery by supporting the Unit via a weekly news bulletin (~4,000 subscribers), quarterly newsletter, annual conference, public lectures, outreach events and communications support. Unit staff are further supported to apply externally for knowledge exchange funding e.g., Sherar; 2019 Research England funded Public Health England PhD secondment, to write an implementation guide on school running programs.

Such activities sit within the purview of SSEHS's enterprise committee which ensures all necessary support is in place to enable impact including school enterprise seedcorn funding and prioritising applications for HEIF **funding**, allocated competitively through the University's Enterprise Project Group e.g., Munir (£3.5k, 2018) set up a SMART Work website for the project toolkit (500 organisations subsequently signed up for its toolkit).

Unit staff are working authentically with stakeholders nationally and globally, influencing their research priorities and **creating impact partnerships** with communities (e.g., Accra community champions, Local Schools Alliances), governments (Ministries of Health e.g. Peru, Ghana and Kenya, Public Health England) and non-government organisations (e.g. PATH, Sport England, Save the Children and UNICEF).

The Unit's first impact case study (ICS) translated research on feeding in toddlers/young children into the Child Feeding Guide. SSEHS provided marketing support (e.g., branded flyers/postcards/posters which healthcare and childcare professionals share with families to disseminate the guide). The REO provided step-by step specialist guidance on developing contracts and navigating IP. HEIF (£4.4k 2014, £27.5k 2017) funded market-testing events and assessment to develop the Guide's content, confirm the market need (particularly among health professionals) and ensure sustainability through App development.

In our second ICS, we worked with community groups and local/national government to inform Kenyan infant feeding programmes. SSEHS seedcorn enterprise funds enabled engagement with stakeholders, including government links, to ensure our research informed strategy for the Baby Friendly Community Initiative (BFCI). Support from the School Enterprise Committee and translational scientists facilitated the plan to engage with government / non-government stakeholders (e.g., UNICEF and the global NGO PATH) to scale the BFCI to 30 of Kenya's 47 counties.

1.4 Research and impact objectives and plans for the next five years

A central part of the unit's **research and impact strategy** is to expand our specialist high quality work on lifestyle medicine by fostering existing partnerships (e.g., BRC, NCSEM) and developing new **interdisciplinary** ones to ensure our research and impact remains relevant to addressing both **emerging** and **contemporary** challenges. Our priorities are:

1. To meet the WHO's target to halt the rise in obesity and diabetes and reduce physical inactivity globally by a relative 15% by 2030, the Unit will build a research programme in **Global Lifestyle Medicine** to widen our research and impact agenda in the Global South.

Building on our influential UK work through NCSEM, the BRC, CLiMB and our NIHR 'Snacktivity' programme, we will leverage existing global health stakeholder networks (e.g. UNICEF, PATH, Save the Children, WHO) and academic partnerships (e.g. African Population and Health Research Centre, Universities of Ghana and Malawi) to use interdisciplinary creative, participatory methodologies developed and piloted during this REF cycle (e.g., with digital designers, Cardiff University), to further develop locally relevant lifestyle (diet and physical activity) interventions that respond to global priorities and emerging challenges (e.g., COVID and food insecurity).

Big data (e.g., data linkage) will also be employed to understand inequalities in behavioural lifestyle factors and disease processes in the global South (e.g., socio-economic, regional, ethnic, and autonomy dimensions) and support this research programme.

2. Utilising our specialist skills in behaviour change, intervention design and physical activity measurement, the Unit will expand its research and impact in lifestyle medicine into **rehabilitation**. We will leverage our status as a founding partner in the locally based Defence Medical Rehabilitation Centre (opened 2018) and National (civilian) Rehabilitation Centre (opening 2024) and work in partnership with NCSEM to address contemporary lifestyle (physical activity and diet) challenges of an ageing population, long COVID19 rehabilitation, loss of workplace productivity, and post conflict/trauma rehabilitation.

Unit-level environment template (REF5b)

To deliver against these priorities, the Unit will:

1. **Develop excellent staff recruited via LU's Excellence100 campaign** and support their growth towards international research leadership (e.g., Paine in Lifestyle Medicine, Johnson in big data) through Loughborough's bespoke Research Leaders programmes and the HWB Challenge early career network.
2. **Expand interdisciplinary and international collaborations:** Physical activity, health and wellbeing are at the forefront of LU's strategic priority to undertake exceptional multi-disciplinary research, which has far-reaching impact on global and national healthcare challenges. Collaborations with Maths and Computer Science will support activity in Big Data at LU. We will also pursue new international collaborations to support our ambitions in global lifestyle medicine (e.g., Kenyatta University, Makerere University and University of Sciences, Techniques and Technologies of Bamako).
3. **Continue to drive impact through building partnerships and supporting staff.** LU's mission is explicit on the importance of collaborations with end-users of our research. The Unit will build its impact partnerships and community engagement, and invest in dedicated support for impact through staff workload allocation and engagement with translational scientists/marketing specialists.

1.5 Open research environment

The University has been a pioneer of the 'Open Agenda', actively supporting repositories for text-based outputs (since 2005) and data (since 2015), working beyond funder (including REF2021) open access requirements. Our landmark Open Research Position Statement committed to depositing the full text of 100% of our primary research outputs in our now unified (2019) Research Repository from 2020 and the Unit achieved this (compared to 50% in 2014).

Many Unit resources are openly accessible. For example, childfeedingguide.co.uk has 100,000 downloads, smartworkandlife.co.uk was accessed >57,000 times a year with 500 organisations subscribing, and vegetablemathsmasters.co.uk has approximately 4000 users. We have led first-time initiatives in open data; for example, Sherar leads the International Children's Accelerometry Database which curates data from 20 studies across 12 countries and was shortlisted for a CALIBRE Award.

1.6 Research integrity

The Unit adopts LU's Code of Practice for Research which is underpinned by the five principles of the UUK's Concordat to Support Research Integrity. Policies and procedures on research misconduct and whistleblowing enable staff/students to report issues without fear of recrimination. The Unit (Rousham) contributes to the University Ethics Committee which oversees and provides training for research with human participants, work falling under the Human Tissues Act, philanthropic gifts, and LU sponsored Health Research Authority ethics applications (see 3.2). In addition to LU ethics procedures, the Unit ensures that all global research is reviewed further by a local ethics committee and project staff are all trained using internationally recognised ethics courses (e.g., FHI 360 ethics). We also ensure all institutions in the global South that we work with have safeguarding/whistle blowing policies appropriate to the contexts in which we work or we capacity build to develop these.

2. People

2.1 Staffing and recruitment policy

All academic staff contribute to teaching, research and enterprise activities. We expect and incentivise collegiality from the earliest career stages and, as careers develop, we expect broader leadership contributions. Academic staff have open-ended contracts, while research staff are on fixed-term contracts related to projects in line with sector norms. Part-time working is welcome and two staff work part-time (1 Professor, 1 Lecturer).

Since REF2014, the University approach to recruiting excellent staff at all career stages, from postdoctoral and early career researchers (ECRs) through mid-career and senior roles, has radically changed, driven by the University Strategy and beginning with the 'Excellence100' campaign which aimed to recruit 100 additional academics across career stages based on excellence. Building on Excellence100, recruitment to established posts is now conducted through biannual recruitment rounds, managed centrally but with significant School input, rather than piecemeal replacement hires. With excellence as the primary criterion, these rounds promote improved succession planning, deliver better international recruitment and improve diversity.

In line with strategic aims to '**increase knowledge through internationally excellent research**' and '**address contemporary and emerging challenges**', the Unit aimed to recruit excellent staff across all career stages. We have recruited influential leadership (Daley, Professor in Behavioural Medicine) as well as diversifying our expertise in recruiting talented ECRs (Johnson, Petherick in epidemiology, Paine in health psychology, Costa in early years physical activity). With 5 staff added (of 11) since 2014, the demographic profile is now: 2 Professors, 4 Readers, 3 Senior Lecturers, 2 Lecturers. One Professor and one Reader are BAME, both female.

On our staffing and recruitment policy, the International Expert Review Panel concluded: "The size, scope and quality of (the growing) faculty is impressive and the dividends in the form of broad recognition internationally are now being reaped, not only in areas of performance enhancement and sports policy, but increasingly in addressing exercise, physical activity and health agenda, across the lifespan and within different populations."

For **succession planning**, SSEHS has deputy positions attached to its leadership, enabling mid-career staff to gain experience. The university has demonstrated sector leadership in its approach to **equality and diversity in succession planning**: as a Reader, Griffiths job-shared the HWB Challenge Lead role with a female professorial colleague from another School, offering opportunity to develop leadership skills while working part-time (0.6FTE). This supported her promotion to Professor (2016), after which she assumed the Challenge leadership outright while still part-time (0.8FTE).

2.2 Staff development strategy

A wide spectrum of training opportunities and support for staff at all career stages is offered by Loughborough's Organisational Development. Drawing on this, the Unit's staff development strategy is shaped by SSEHS SLT and its Human Resources Advisory Group (HRAG), which has a diverse membership (by age, job grade, gender, and ethnicity). Through its Athena Swan activities, SSEHS launched a sponsor-mentor programme, in which 9 Unit staff engaged, with overwhelmingly positive feedback:

- *"the programme ... provided me with opportunities to learn from experienced colleagues who have been generous with their time and ideas."*
- *"As a mentor, I've thoroughly enjoyed being able to support ECRs working across disciplines and to watch them flourish as academics."*

All academics are expected to obtain **Fellowship of the Higher Education Academy** (HEA). For new lecturers, this is integral to their dedicated development programme. More experienced colleagues are supported through our 'Recognition of Experienced Practitioners' scheme (e.g. Sherar and Haycraft became Senior FHEA).

Following the principles of the *Concordat to Support the Career Development of Researchers*, the University provides structured support to **postdoctoral researchers** for career progression and development, including preparation of funding applications. This was recognised by the European Commission's HR Excellence in Research Award (since 2010, renewed after external review every 4 years). This includes 'Recognition of Teaching for Researchers'. Eleven research associates currently work in the Unit (70% female). They regularly attend seminars, monthly

Athena Swan events, social events and a wide variety of SSEHS, NCSEM and BRC training activities. Specialist groups in physical activity and global health also hold regular journal clubs, career progression workshops and presentations. The LU Research Staff Association runs a mentoring programme, helping staff to build their CVs for career progression and gain internal promotions (e.g., Pearson to Senior Research Associate) or appointments in other UK universities (e.g., UCL, Leicester).

Under the **New Lecturers' Programme (NLP)**, ECRs are guided by an experienced and trained academic colleague who acts as Adviser:

"... my mentor gave me valuable and targeted advice to advance my research portfolio, while always considering the balance between work and family life, for someone who is working part-time and having to deal with the continuous (and sometimes unexpected) demands of caring for young children."

The NLP (formerly academic probation) was substantially revised in 2017 and includes the full spectrum of research and impact activity (publication, funding applications, collaboration, public engagement, non-academic partnerships). New lecturers have a reduced workload in teaching (33, 50 and 67% of School norms in consecutive years), which enables the establishment of a full academic profile in research, teaching and impact at a manageable pace. In addition to an extensive training programme leading to FHEA, the New Lecturer and Advisor meet formally four times annually and more frequently informally. New Lecturers are allocated a University-funded PhD studentship within their first two years, for co-supervision with an experienced colleague. Supervision is a requirement to pass the programme, alongside a minimum expectation on research output production, and the submission of at least one substantial grant application. SSEHS ringfences seed-corn funding for ECRs, and provides opportunity for leadership development through ECR posts on research committee and HRAG. During the assessment period, 2 staff completed the NLP (1 subsequently promoted) and one is currently enrolled on the NLP.

All post-probationary staff have an annual **Performance and Development Review (PDR)**. This University scheme was totally updated in 2017. A supportive one-to-one discussion between the reviewee and a trained reviewer reflects on achievements over the past year and agrees performance and developmental objectives across the full range of activities including CALIBRE-aligned goals for research and impact activity. PDR is a transparent way to recognise performance exceeding expectations with additional financial **reward**. The new scheme has particularly benefitted research staff for whom a rigorous developmental discussion was previously sporadic and consideration for reward rare. PDR is overseen by a Senior Review Group, whose decisions are subject to equality impact assessments.

In SSEHS, the HRAG advises the Dean on promotion cases and proactively engages with staff. PDR also identifies promotion candidates. In 2016, the University revised the criteria for **academic promotion** (Senior Lecturer and Reader/Professor), to ensure that the research components align with the University Strategy and CALIBRE. Evidence for cases can be based on research, teaching, enterprise (impact) or any combination to encourage balanced portfolios. The personal titles promotion committee (Daley is a member) takes into account applicant statements describing how personal circumstances, such as caring responsibilities, may have affected their profile. Since 2015, 8 Unit staff achieved at least one **promotion**, supporting retention of existing staff.

Research and impact leave is available in the form of School and University Fellowships, providing up to 12 months away from regular workload to pursue agreed programmes. For example, Sherar developed collaborations with stakeholders in physical activity and health at LU. All staff are eligible, including part-time, and diversity is routinely monitored.

2.3 Postgraduate research (PGR) students

Commitment to Excellence extends to PGR recruitment and development. The Unit currently has a population of 36 PGRs (July 2020, 20% international, 55% female) who study in a vibrant school community (n=220) and report satisfaction levels above the national average (83-90%, 2017/2019 Postgraduate Research Experience Survey). Part-time study is welcome (24% SSEHS PGRs 2019/20), supporting PGRs with work/caring commitments. Since 2014, the Unit has graduated 23.6FTE PhD students.

In 2019/20, the PGR **funding** profile was: 40% internally funded, 30% co-funded with external partners and 30% externally funded from partners such as London Marathon, Leicestershire NHS Trust, NIHR-CLAHRC and overseas governments e.g., Kuwait, Sri Lanka. The Unit offers interdisciplinary studentships to address important health challenges e.g., reducing hospital falls in the elderly (with Design and Creative Arts), female autonomy (subject of a university mini Centre for Doctoral Training) and nutrition (with Social Sciences and Humanities), and water, sanitation and health (with Architecture, Building and Civil Engineering).

PGRs are also supported by the Doctoral College (DC), launched in 2016 and led by an Associate Pro Vice-Chancellor, who ensures consistent governance and a high-quality student experience.

Recruitment uses the School, University and recruitment websites (e.g., jobs.ac.uk and findaphd.com). Candidates meeting essential criteria (e.g., minimum 2:1 degree, IELTS 6.5 for international students, and relevant essential skills e.g., statistics) are shortlisted and interviewed (remotely/in person) by a gender diverse panel. SSEHS Athena Swan committee reviews applicant diversity to identify inequalities and take necessary action (e.g., recent advert wording changes to welcome female/BAME applicants).

The DC and SSEHS run **induction** events for new starters. All students have at least two **supervisors**. They meet at least monthly and usually more frequently, with minutes recorded in the online Co-Tutor tool. The ADR, Director of Doctoral Programmes (DDP) and Deputy (aligned to the Unit) ensure a high-quality supervision experience, with funding available for research expenses and conference attendance. Unit PGRs have progress reviewed in months 1 and 6 with the Deputy Director and annually via the PGR board. Student **progression** is decided at annual reviews, based on a report and viva with an independent examiner.

Further specialist **support** is available from the Mathematics Learning Support Centre, the English Language Support Unit, the Student Advice Centre, the Careers Network, and the Student Wellbeing and Inclusivity Service. Schools have elected PGR student representatives who are members of the Staff-Student Liaison Committee. SSEHS has an elected PGR president sitting on its Research Committee. Engaging with PGR representatives, participation in PRES and the DC Wellbeing Survey ensures actions we take are based on students' feedback.

The DC offers over 200 **skills development** events annually, from induction and international orientations for new students to transferable skills and employability training to meet the requirements of the Vitae Researcher Development Framework. Major events include the annual research conference and summer showcase, and the 'Café Academique' forum to debate emerging research ideas. The DC's Graduate House provides a dedicated space for PGRs to study and network across disciplines. In the Unit, PGRs receive research methods training and present in seminars internally and at national/international conferences. PRES results show 87.1% satisfaction with development of skills in applying appropriate research methodologies. Additional opportunities are available through the BRC's flagship Academic and Clinical Excellence Group, which offers Unit bi-monthly, bespoke training (e.g., PPIE, GCP), NCSEM public lecture series and conferences, and workshops organised through CLIMB. All students have an opportunity to gain teaching experience (c.25% uptake 2020), after completing the University's PGR Teaching Skills course. New PGRs are offered a 'Buddy' for peer support and encouraged to attend school Athena Swan networking events.

Unit-level environment template (REF5b)

Evidence of success in supporting PGR careers is shown in:

- Awards: McEwen Poster prize. American Society of Human Biology conference grant, Society for the Study of Human Biology/Ruggles Gates fieldwork grants.
- Career destinations: AXA Fellowship, NHS, Public Health England, leading UK universities (e.g., LSHTM, UCL, Nottingham, Birmingham, Sheffield, Leicester) and international universities (e.g., Yale, University of Ghana, Toronto Sick Children's Hospital).

2.4 Equality and diversity

Led by the University's people Strategy, EDI is integral to the Unit's staffing and recruitment policy and succession planning. Recruitment advertisements use positive role models and promote family friendly policies including part-time working. All interviewers undertake mandatory training including unconscious bias and panels are gender mixed.

LU renewed its Level 2 Disability Confident Employer certificate (2019) and was one of the first ten UK HEIs to adopt the Race Equality Charter (2018). LU **supports staff with protected characteristics through** the Staff Age Group; BAME Network; Disability Group; Part-time Staff Group; Religion/Belief Group; LGBT+ Group; Women's Group; Armed Forces Network; International Staff Group, and the Working Parents' Network.

SSEHS holds (renewed 2020) a silver Athena Swan Award confirming the Unit's commitment to gender equality. The Unit has a demographic profile favouring females (10/11) including 2 BAME colleagues. Female leadership has been fostered via sponsorship on leadership programmes (e.g., Aurora: Sherar, Rousham, Haycraft, Petherick), and awards (5 Unit staff received an Athena Swan award for leadership achievements). The Unit has contributed influential research to inform national strategy to address EDI issues (e.g., Munir co-authored AdvanceHE report on Tracking Women's Work Experience in HE).

All school committee agendas have a standing item on EDI. Research committee monitors funding submissions and awards by grade and gender to ensure equal opportunity. This showed female staff had been able to submit relatively more applications than males since 2017. Review has now been extended to ethnicity.

The Unit has supported all requests for **flexible/part-time working**, facilitated remote working and supported timetabling of important meetings between 10:00-16:00 where possible to support staff with parental responsibilities. Remote working is facilitated via the VPN (with secure multifactor authentication) that provides access to all University online resources. These arrangements eased the transition to effective home working during the COVID-19 pandemic.

All Unit staff returning from **maternity leave** since 2014 were offered and accepted a phased return, with temporary FTE adjustments. Where staff require **support to attend a conference/workshop** or research visit with a dependent, SSEHS considers requests e.g. Unit Professor supported to claim travel costs for her breastfeeding toddler to facilitate training workshop attendance.

All Schools have **Wellbeing Advisors** who can be contacted by staff and PGR students for support and our Employee Assistance Programme operates a 24/7 confidential helpline.

2.5 Equality and diversity in the REF submission's construction

The University Research Committee created **the REF Code of Practice (CoP) Working Group** in October 2018 with diverse membership. All submission preparations were conducted in accordance with the CoP and subject to Equality Impact Assessments. The Unit assembled a representative (gender, career stage, part-time working, ethnicity) team (n=5). All members underwent REF-specific Equality and Diversity training.

Unit-level environment template (REF5b)

All submitted outputs were reviewed by at least three peer reviewers. Our outputs selection and assessment processes were fully in line with Loughborough's Responsible Metrics Policy. To ensure fair, consistent and transparent selection, we identified outputs that convey the most original, significant and rigorous work produced by the Unit's current or former staff. The submission was subject to Equality Impact Assessments, considering gender, maternity leave, ethnicity and ECR status, which revealed no bias.

3. Income, infrastructure and facilities

3.1 Research funding and strategies for generating research income

Since 2014, the Unit was awarded ~£8.1m as the lead institution from a diverse range of funders. This funding extends into the next REF period, demonstrating sustainability; ~£4m was spent over this REF period. 71% of funds were awarded in the last 2 years evidencing the success of our funding strategy and continuing growth of the Unit since 2014. Members of the Unit identify research funding opportunities via email alerts from Research Professional, personal communication from the Research Development Managers and through our Athena Swan Mentorship programme. Staff are supported in writing high quality bids through training courses, a peer review scheme and support from the Research and Enterprise Office (REO). Staff, in particular ECRs, are offered seedcorn funding and PhD studentships to progress nascent ideas into full grant applications.

Our research funding strategy was to expediently advance our research and influence in public health by:

- Growing our influence and capacity in lifestyle medicine through prioritising applications for larger, longer-term funding to NIHR to expand our internal capacity and external visibility, including working with partners
- Developing early-mid career researchers, particularly through support for external fellowships
- Strengthening existing academic/policy networks and supporting global health research in LMICs through GCRF funding
- Diversifying funding, including pursuit of multidisciplinary, collaborative grants, with medical partners (e.g. Nottingham/Leicester NHS trusts) and international collaborators.

Over 90% of Unit grants were awarded for more than 2 years, showing success in obtaining longer term funding. Successes with new funders included EPSRC (Petherick), Waterloo Foundation (Sherar), NERC (Rousham), NIH (Johnson). Highlights from the portfolio include:

- A **prestigious** NIHR professorship (Daley, £1.82m, 2019-24) to launch the Centre for Lifestyle Medicine and Behaviour (CLiMB) and conduct high impact research.
- Further **prestigious** Fellowship awards: MRC New Investigator grant (Johnson, £429k, 2017-21) on socioeconomic inequalities in obesity, British Academy mid-career fellowship (Griffiths, £100k, 2012-14) on 'Birth to Twenty Plus, South Africa'
- **Major grants** in Lifestyle Medicine are headed by our partnership (2017) in an £11.6m NIHR grant (2017) in a **consortium** with Leicester's Hospitals, and University of Leicester to establish a Biomedical Research Centre (BRC) to drive clinical and applied research in diet, lifestyle and physical activity, cardiovascular disease, respiratory disease and precision medicine.
- **Additional major grants** were received in Lifestyle Medicine (NIHR, Daley and Sherar, £2.2m, 'Snackivity' intervention to promote physical activity and reduce disease risk; 2019-24) and Global Health (MRC/Newton, Rousham, Griffiths, and Haycraft, £1.06m, 2019-22) to develop new strategies to address the dietary risks of anaemia and excess energy intake in Peruvian infants and young children.
- Global health research in LMICs with **international collaborators**: Rousham, Griffiths' UKRI/GCRF/Newton rapid response grant on infant feeding and infant health services during COVID19 in Peru (£214k, 2020-22).

- **Collaborative grants with medical partners:** Munir leads the PROWORK (PROmoting a sustainable and healthy return to WORK) study (£371k; 2019-2022) funded by the Midlands Engine.

In global health, we secured funds to support our growing networks e.g. Rousham's membership of an influential NERC funded (£250k) integration group "AMR in the real world" (13 institutions) and Griffiths' British Academy project (£300k, 2019-21), which evolved from a stakeholder engagement meeting, in which the Kenyan Ministry of Health expressed their need to adapt existing infant health support programmes to the cultural needs of nomadic cattle herders.

Funding has delivered **high impact publications** to the BRC's Lifestyle and Respiratory themes e.g., Narratives surrounding physical activity in COPD patients, Sherar, Soc Sci Med (Department of Health, 2013-16. £135k); Effectiveness of the SMARt work intervention, Munir, BMJ (NIHR, £540k, 2015-18); Evaluation of the Girls Active School Intervention, Sherar, IJBNPA; (NIHR, £599k; 2014-16).

3.2 Organisational infrastructure supporting research and impact

Organisational support has been vital in delivering the Unit's research strategy to lead on large strategic grants in new growth areas (e.g., lifestyle medicine), develop fellowship applications and build global networks/partnerships. The effectiveness of this support is evident in the speed at which new appointees have achieved funding successes e.g., Daley was awarded a 5-year NIHR programme grant and an NIHR fellowship within her first 18 months, and Johnson received a 3-year MRC fellowship within 12 months of appointment.

The Research and Enterprise Office (REO) comprehensively supports our research and impact ambitions by alerting Unit staff to funding opportunities, guiding development of applications, supporting costing (with Unit-based colleagues), developing collaboration agreements, protecting IP and know-how, and providing legal advice, which has been invaluable for contracts with overseas partners requiring extensive due diligence. **Research Development Managers (RDMs)** work directly with staff, directly assisting with application drafts, preparing supporting letters, and liaising with the funder. RDMs assigned to the HWB Global Challenge and the Sport and Exercise Beacon work particularly closely with Unit staff. For example, RDMs supported Daley's 2019 NIHR Professorship award with feedback on links to policy and arranging for feedback from six senior academics.

Substantial work has been undertaken to permit LU to sponsor Health Research Authority (HRA) ethics applications and refine the infrastructure for research governance (including training in Good Clinical Practice and support in obtaining an NHS Research Passport). With support from our clinical partners (e.g., Leicestershire NHS trusts), we have also developed and refined standard operating procedures and data management policies so the REO can now assist Unit staff and PGRs in gaining HRA ethical approval. We have excellent working relationships and research governance support through the Clinical Trials Units at the Universities of Birmingham and Leicester, which have enabled several NIHR funded health behaviour trials (Munir, Daley).

The REO also provides targeted skills training to aid **Researcher Development: CALIBRE's Research Leaders** programme and its **Institute of Advanced Studies (IAS)**. The Research Leaders programme provides extensive support for new (Petherick, Johnson) and early career (Paine, Costa) Unit staff in applying for research fellowships and grants. The IAS brings world-leading researchers to our campuses to engage in its Open Programme and Annual Themes: in 2017 Sherar led part of the *Motion* Annual Theme with international speakers from ETH Zurich, University of Johannesburg, and Vrije Universiteit Brussels. International House, home of the IAS, provides a welcoming environment for international visitors.

3.3 Operational and scholarly infrastructure supporting research and impact

Unit staff offices are co-located within the modern NCSEM building which also provides hot desks for clinical staff, space for research staff and PGRs, seminar rooms, clinical facilities including nine consulting rooms, clinician-researcher dedicated meeting spaces, and specialist rehabilitation spaces. NCSEM space was designed to allow academics to engage seamlessly with clinicians and allied health professionals on contemporary questions in lifestyle medicine. Unit staff are uniquely placed for clinical data collection on health and lifestyle behaviours, complementing ‘field’ data collection to facilitate response to national and global public health challenges.

NCSEM offers a state-of-the-art 3-D MRI scanner, DXA, and musculoskeletal ultrasounds, which have accelerated the Unit’s work in exercise and bone health (Brooke-Wavell). Innovations in lifestyle medicine research enabled by the MRI include a novel study on the brain activation response to personalised health and physical activity feedback from self-monitoring technology (Sherar), which informed the development of the App used in the Snackactivity NIHR Programme (Daley, Sherar). NCSEM also has an observational research kitchen for eating behaviour research (e.g., emotional overeating in children; Haycraft). The facility provided pilot data to enhance the quality of subsequent funding bids (e.g., Haycraft; app-based intervention to increase children’s vegetable consumption, submitted to MRC PHIND,2020). On visiting NCSEM, the International Expert Review Panel said, “*The physical infrastructure that exists is enviable*”.

To measure the dose and context of physical activity, sedentary behaviour, sleep and rehabilitation, the Unit has location sensors (e.g., accelerometers, GPS), continuous blood pressure and glucose sensors, heart and breathing rate sensors and body-worn cameras. This digital and point-of-care research equipment enables large-scale and rapid ‘field’ data collection (e.g., homes, schools, (peri)clinical settings, workplaces) for large research projects (e.g., NIHR workplace and Snackactivity grants).

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

The strategy of the Unit is to collaborate on interdisciplinary research to make a positive impact on the health and wellbeing of populations across the life course.

4.1 Research collaborations, networks and partnerships

Loughborough’s **NCSEM** is at the very heart of this Unit. As a collaborative Centre with the Universities of Leicester and Nottingham and their NHS Trusts, it is the foundation from which our significant regional collaborations are built including the **Leicester/Loughborough BRC** and the **East Midlands ARC**. Our regional collaborations align with the University’s position in the **Midlands Innovation (MI)** partnership of the Midlands 8 research-intensive universities (with Aston, Birmingham, Cranfield, Keele, Leicester, Nottingham and Warwick). MI’s ‘Health’ programme, **Midlands Innovation Health**, supports the Midlands Engine which funded Munir’s PROWORK (PROmoting a sustainable and healthy return to WORK) project supporting Midlands employers to improve the future of workplace mental health and wellbeing (with Nottingham, Birmingham and Warwick universities). These regional collaborations in turn lead to national collaborations such as the **NIHR Diet, Activity and Research Translation (DART) Collaboration** (10 BRCs across England including Bristol, Cambridge, Guy’s & St Thomas, Imperial, Leicester, Manchester, Newcastle, Oxford, Southampton and UCLH) and our new **Centre for Lifestyle Medicine and Behaviour (CLiMB)**, with multiple partners including Oxford University, Deakin (Australia) and Harvard (USA).

The Global South has been a particular focus for international partnerships. In Lifestyle Medicine:

- Following an MRC-funded workshop at NCSEM (2018), we developed a research programme with the African Population and Health Research Centre (“*the continent’s*”

premier research institution, generating evidence to drive policy action to improve the health and wellbeing of African people”), leading to £1.5m research funding (British Academy, MRC, NIHR), Fellowships (Wellcome Trust and AXA), engagement awards (Wellcome Trust), and a OpenIDEO World Food Vision Prize. These joint awards have enhanced stakeholder engagement, enabled exchange for ECRs and underpin an ICS.

- HWB Challenge networking events including ‘ideas workshops’ with global experts and stakeholders led to new partnerships e.g. Universities of Ghana, Witwatersrand, Development Studies (Ghana), Health and Allied Sciences (Ghana), and Cape Town, Instituto de Investigacion Nutricional (Peru), and Digital Innovations for Development in Africa network with digital designers at Cardiff University.
- The Unit jointly leads a British Council PhD programme (2020) with the Universities of Witwatersrand, Stellenbosch, Limpopo, Western Cape and Cape Peninsula (specifically for staff from historically disadvantaged universities).

In Epidemiology and Population Health: ECR Johnson received a travel grant (2017) for a 7-day research trip to Samoa to form a research collaboration with academics (from Brown and Yale) and local experts on infant growth in Samoa. The ethnographic data and collaborative visits launched a sustained collaboration (e.g. via a joint supervised PhD student) which led to an NIH grant (\$183k, 2018-20) to develop Samoan-specific foetal growth references.

The Unit has also been active in major international project collaborations. For example:

- ECR Paine is the UK lead of a major international study (iCARE) led by the Montreal Behavioural Medicine Centre with University **partners from 39 countries** to understand people’s response to COVID19.
- Sherar co-leads the International Children’s Accelerometry Database (ICAD), funded by the MRC National Prevention Research Initiative. A **global consortium** (20 institutions including Cambridge University, Norwegian School of Sport Sciences, University of Agder, University of East Anglia) has harmonised data from 37,000 young people across studies from Europe, US, Brazil and Australia. ICAD was shortlisted for a CALIBRE Open Research Award 2019.

During our expansion since 2014, professorial honorary appointments have strategically bolstered intellectual leadership in behavioural medicine (Biddle, University of Southern Queensland) and epidemiology (Demerath, University of Minnesota), and strengthened local clinical partnerships (Singh and Steiner in Rehabilitation, Leicester NHS Trust; Batt, Nottingham Queens Medical Centre).

4.1.1 Key Research Users and Beneficiaries

The Unit benefits from two major hubs, NCSEM and The Defence Medical Rehabilitation Centre (DMRC), which attract research users and support initiation of partnerships:

- Sherar’s ‘Making Strides’ symposium (2016) at **NCSEM** brought together 52 stakeholders from health, education and sport (e.g., Public Health England, Department for Education, Sport England). This resulted in a research programme (funded by London Marathon) on the ‘Daily Mile’ schools running initiatives and our implementation guide (co-produced with PHE) for schools and commissioners (2019) supporting our research impact.
- DMRC at Stanford Hall, just outside Loughborough, opened in 2018. In February 2020, the associated National Rehabilitation Centre (NRC) confirmed Loughborough as joint lead with University of Nottingham) for the **NRC Academic Partnership (NCAP)**. DMRC’s WgCmdr Bennet and Surgeon Captain Stapley are Unit Visiting Professors.

Productive and ongoing international collaborations exist with governments (Ministries of Health in Malawi, Kenya, Ghana and Peru, DEFRA, US Center for Disease Control), industry (COSMED, Ipsos MORI), NGOs (UNICEF, WHO, Save The Children, and community groups (Maasai). We develop these collaborations through stakeholder and community sensitisation events that we have proactively held, supported by introductions made by our local academic partners. Outcomes include:

Unit-level environment template (REF5b)

- Sustained community-based programmes to support infant feeding and growth in Kenya and Peru (Griffiths, Rousham, Haycraft)
- Enhanced policy and service planning in the face of extreme climate events in Ghana (Griffiths)
- Policy actions to reduce antimicrobial resistance globally through a government (Wellcome, US CDC and UK Government Science and Innovation Network) white paper: “Initiatives for Addressing Antimicrobial Resistance in the Environment: Current Situation and Challenges” (Rousham).

4.1.2 Wider Contributions to the Economy and Society

Weekly NHS clinics operate from the NCSEM including Pulmonary and Cardiac Rehabilitation and elective Orthopaedic Services. The clinics link to research studies (e.g., BRC funded evaluation of the Breathlessness rehabilitation programme) to improve NHS services. Through NCSEM, the Unit offers high quality training to health professionals promoting health and wellbeing through physical activity and diet (e.g., Costa’s Early Movers practitioner training). Six Unit staff have also engaged with the NCSEM public seminar series and PPIE events. With NCSEM-Sheffield, we conducted an evaluation of six Moving Professionals programmes (commissioned by PHE, Sport England) including training resources for UK medical schools and the Clinical Champions programme.

We use our links to NCSEM PPI groups not only to ensure that the experiences of multi-ethnic communities inform our research (e.g., South Asian adolescents and physical activity, Griffiths and Sherar and bone health in Bangladeshi communities, Brooke-Wavell) but also to engage in regional activities such as raising awareness around healthy eating and activity through the Leicester Centre for BME Health.

The Unit’s research responds to global sustainable development goals (SDGs), specifically SDG3 to support good health and wellbeing and overlaps with SDG2 (no hunger) and SDG6 (clean water and sanitation).

4.2 Contribution to the sustainability of the discipline

Significantly, the Unit has had an influential role in setting the UK agenda for exercise as medicine via:

- Advisory board roles: NCSEM (Daley, Griffiths, Sherar), Public Health England (Sherar), Scientific advisory network for Centre for Longitudinal Studies Cohorts Theme: Tackling the Obesity Challenge (Johnson)
- Training a new workforce through the Exercise as Medicine MSc (launched 2018) to treat and prevent illness through physical activity.

Unit staff sustain the Lifestyle Medicine and Epidemiology disciplines internationally with examples including:

- UNICEF/ Lego Foundation consultation on parenting programmes for Early Child Development (Griffiths),
- WHO Technical Report; “Strengthening Health Systems through Drug Shops” (Rousham)
- Visiting professorship appointments (e.g., University of the Witwatersrand, South Africa (Griffiths); University of Saskatchewan, Canada (Sherar).

4.3. Indicators of wider influence

Unit staff are active in all aspects of their research communities, and influential in many. We acted as peer reviewers for funders (e.g., NIHR, UKRI, Wellcome, Diabetes UK, BHF) and high-quality journals, and externally examined 46 PhDs over the REF period. We are shaping our research fields by hosting conferences and meetings e.g., Johnson co-hosted, with Prof. Cole (UCL), the Society for the Study of Human Biology annual conference which focused on Cohort Methods and Applications in Human Biology (Oxford, 2019).

Editorial roles

The unit collectively holds/has held, since 2018, 20 journal editor roles, including Associate Editor of BMC Public Health (Johnson, Munir, Haycraft, Daley), Editorial Board for Annals of Human Biology (Griffiths, Sherar) and International Journal for Behavioural Nutrition and Physical Activity (Daley). Johnson was promoted to Deputy Editor for Public Health Nutrition in 2020 where he approves final decisions on manuscripts and advises on methodological rigour of submissions.

Invited and plenary presentations

The unit has delivered over 140 invited presentations since 2015 e.g., Empowering families to create healthier eating habits (International Conference on Nutrition and Growth, Paris, 2018, Haycraft) and Heterogeneity in childhood to young adulthood obesity (European and International congress on obesity, Dublin, 2020, Johnson).

We are actively **engaged with funding agencies**, for example:

- Daley: NIHR HTA Clinical Evaluation and Trials Funding Board.
- Rousham: MRC/GCRF Health and Context funding panel deputy chair and ESRC. Antimicrobial Resistance in the Environment panel.
- Griffiths: Wellcome Trust International panel co-chair, NIHR Global Health Systems and Policy Research panel and MRC/GCRF for non-communicable and infectious diseases panel.

Unit staff have also been invited to take a number of **advisory roles**:

- Brooke-Wavell is a member of The National Osteoporosis Society Exercise Expert Steering and Working Groups - her research on exercise and bone health informed their national guidance for healthcare professionals.
- Rousham was appointed to the UK Government Science and Innovation Network as a Technical Advisor on antimicrobial resistance in 2018-19, joining a taskforce with US CDC and advisor to the UK Parliamentary Office for Science and Technology.
- Griffiths: Chair of Warwick Global Health Research Unit steering committee on slum health.
- Daley: Chair of two NIHR trial steering committees.
- Sherar: member of PHE's COVID: Expert Rapid Review Service for professionals and the public, 2020.

Unit staff have also **influenced the UK government's child and adult obesity strategies**:

- UK Royal Society for Public Health supported PACE labelling (Daley) to replace the current food labelling system.
- As a member of the Chief Medical Officer's working group, Sherar contributed to formulation of the 2019 UK physical activity guidelines.

Our strategic aim has been to offer thought leadership in physical activity and nutrition (in the UK) and nutritional interventions (in the global South). The invitations Unit staff have accepted to join respected bodies seeking influential opinion, from funding bodies to governmental bodies to academic journals, underline how Unit staff are setting agendas nationally and globally.