Institution: University of the West of Scotland

Unit of Assessment: 03: Allied Health, Dentistry Nursing and Pharmacy

1. Unit context and structure, research and impact strategy

1.1 Structure of research

The School of **Health and Life Sciences (HLS)** is **the largest provider of nurse education in Scotland** (2,409 pre-registration nursing and 395 midwifery students), with a high proportion of Nursing and Midwifery Council (NMC) registered staff who are experienced practitioners. **HLS** was formed in 2018, to merge the former Schools of Health, Nursing and Midwifery and the biomedical and sports components of the School of Science and Sport. Having secured **GBP11,700,000** of external funding and generated **457 research outputs** with **6,319 citations** over the current REF period, HLS is an **internationally recognised academic unit**.

HLS research benefits from **visiting appointments** with the Universities of Glasgow (where these are reciprocated), Strathclyde, Newcastle, Queen's University Belfast, Hamburg, and Charles University (Cz) ensuring close integration of biomedical and practice-based disciplines. Furthermore, **investment of GBP4,500,000** in **state-of-the-art research spaces and laboratories** at the new Lanarkshire Campus significantly up scales research capabilities. This submission comprises research undertaken by **33 headcount/32.5 FTE academics** who have produced highly impactful outputs in wide-reaching biomedical/nursing/health journals. These publications derive from research collaborations with NHS partners, medical schools, major charities, Care Homes and other service providers. Research has grown and intensified through external funding from prestigious sources including: Special EU Programmes Body (SEUPB), BBSRC, CSO, Wellcome Trust, Versus Arthritis, Carnegie Trust, Alzheimer's Society, McMillan Cancer Research, Cunningham Trust, Royal Society, Leverhulme Trust, Tenovus and industry.

HLS includes three research institutes, **Institute of Health and Care Research (IHCR)**, **Institute of Biomedical and Environmental Health Research (IBEHR),** and **Institute of Clinical Exercise and Health Science (ICEHS),** providing research leadership and infrastructure. IBEHR and IHCR (successor to the Institute of Healthcare Policy and Practice (IHCPP) described in REF2014) form the key pillars for this submission. IHCPP's primary purpose was growth in research capability, accelerating maturation of the relatively young nursing and midwifery research culture.

Research active staff from the Divisions of Adult Nursing and Healthcare, Mental Health Nursing and Integrated Practice, Midwifery and Specialist Nursing, Biological Sciences and Health, are affiliated to IBEHR/IHCR, and Sport and Exercise Divisional staff to ICEHS. Divisionally based post-graduate research students (approximately 71) are affiliated to appropriate research institutes.

In 2019, revalidation of the NMC Adult Nursing and Mental Health Nursing programmes enabled introduction of an Honours year to both programmes for 40-50 students. This development signals an upward **step change for research within nursing in the School** and creates opportunity to explore clinical academic careers.

Buoyant undergraduate student numbers in biology-related courses have remained stable over the REF period, while the PG cohort has increased, partly through the introduction in 2019 of the Master of Public Health course. Increasing research opportunities have been beneficially embedded in courses, reflected by the considerable rise in UG professional graduation data from 67% to 96% since 2013/14.

1.2 Review of REF 2014

In REF2014, IBEHR (including 3 IHCPP researchers) received an overall rating of 63% internationally-recognised research excellence, with 16% of outputs rated as world-leading and 88% of environment rated at international level. REF2014 feedback recognised the high proportion of ECRs included as a positive institutional investment.

Central to our 2014 research plan was the establishment of synergistic research institutes, with the capability to translate discoveries from the laboratory to human environment and healthcare studies in areas of national and international importance.

Having exceeded research activity and impact growth targets through research capability development, we have laid foundations to build interdisciplinary research in key areas including **progressive and enduring conditions of global significance** (dementia, arthritis and COPD).

1.3 Research Objectives (2014-2020)
Informed by review of REF2014 performance, our key strategic research and impact goals (2014-2020) have been to:

1. Grow capabilities, confidence and numbers of research staff aligned to IBEHR / IHCR, promoting a culture of research activity and engagement.
2. Invest in ECR and mid-career researcher development.
3. Increase number of nursing/midwifery staff with PhDs by 30%.
4. Increase PGR student numbers and timely completions.
5. Grow strategic research partnerships and external collaborations.
6. Through IBEHR and IHCR build impactful thematic research and incubate nascent areas with potential.

1.4 Current REF Period
To deliver the goals listed in 1.3, School Research Enabling Plans progressed through stages of fostering a managed research environment with an emphasis on metric led improvement, towards integrated approaches to enable research propelled teaching programmes.

The three School Institutes worked to thematically and **collectively grow** and mature the School research culture and **amplify impact** with recent focus on **UN Sustainable Development Goals (SDGs)**.

IBEHR combines research focused on humans, health and disease, and the environment, organised within 3 themes: **chronic inflammatory disease**, **infection & microbiology** and **environmental health. IHCR** research is focussed on four themes: **dementia**, **mental health** (global and forensic), **deteriorating patient**, and **learning for practice**.

1.5 Achievement of strategic research goals (2014-2020)
Strategic Goals 1-3 (see 1.3 above) focussed on research capability and capacity development (particularly for NMC registered staff) and both ECR and researcher development to upscale research activity. Through strategic investment in **research capability development of NMC registered staff,** we have exceeded our target increasing the number of healthcare staff returned from 3 to 21; a **sevenfold increase**. Growth in numbers of nursing staff with doctorates has also been exceeded, with 12 completing part-time doctorates, and new doctoral appointments.

Engineered interconnectivity between IHCR and IBEHR has strengthened researcher development across disciplines. Building on this forward-looking enhancement of the research staff base, the current submission evidences an upward trajectory as seen by the emergence of IHCR, the inclusion of Centre for Environmental Research (IBEHR) staff as the critical mass to support a UOA7 submission, and the successful operation of the Infection & Microbiology Research Group at the interface of biomedical, healthcare and environmental research with staff being submitted across both UOA3 and UOA7.

Strategic Goal 4 (see 1.3 above) addressed the challenge of low experienced supervisor capacity through a strategic staffing policy, combined with tactical composition of interdisciplinary supervisory teams, including experienced supervisors from other Schools. Since REF2014, when 4 nursing PhDs were reported in UOA3, we have focussed on timely completions alongside expanding student numbers. Verifiable UWS doctoral graduation data confirm the number of PhD completions to be 61 within the census period. This represents an above **sector completion rate of 90%** within the maximum period of registration, a substantial achievement which evidences the **success of our targeted approaches to developing supervisory capacity**.

Strategic Goals 5-6 (see 1.3 above) focussed on growing strategic partnerships and impactful research. These inextricably linked goals involved brokerage of research collaborations with centres of research excellence within the UK and internationally for example **Queens University Belfast**, the Universities of **Glasgow, Edinburgh, Strathclyde** and **Newcastle** in the UK, **Charles University** (Cz.), **Dundalk Institute of Technology** (Ir.), and the **University of Alicante** (Sp.). In addition, we have strengthened relationships with national and international agencies, including **NHS Education Scotland**, Institute for Research in Social Services (IRISS), Age Scotland, **Alzheimer Europe,** and **Eurocarers**.

1.6 Achievement of Impact
By **focussing on major health challenges of the 21st Century**, we have amplified the direct impact of our research locally, nationally and internationally. Our strategic priority areas for growth have been:

(1) progressive and enduring conditions, and
(2) acute and life threatening deteriorations.

Our School strategic research priorities reflect the applied nature of our scholarship and the **UWS commitment to optimising human health and well-being, protecting lives, and addressing health related inequalities that are important to our local communities and important to global health.**

Stakeholder partnerships and user involvement in our research are key elements within our impact strategy. Timely dissemination and creative public engagement are integral to our research approaches and impact amplification.

1.7 Impact Case Studies and Reflections on Impact Approach
Early identification of project impact targets with external stakeholders and research end users, yielded five viable candidate impact case studies (ICS), **more than doubling ICS numbers achieved in REF2014**.

Impact amplification strategies included stakeholder and user involvement during project design, crafting of project specific impact pathways, diversity and creativity in public, and wider stakeholder engagement activity plans and connectivity with national policy and public health programmes.

Dementia Research has benefited directly from our strategic partnership with the national leading dementia charity, Alzheimer Scotland, and alignment with the World Health Organisation (WHO) Global Dementia Action Plan which directly influenced Scotland's national dementia strategy. Examples of new relationships proactively brokered to amplify impact of our dementia and employment research include those with Trade Unions and Age Scotland.

Acanthamoeba keratitis (AK) research is a focal point for a vibrant network including Ophthalmologists, contact lens practitioners, industry and patients. Our discoveries advanced development of new prevention solutions and influence ongoing cases by directly testing clinical isolates for drug susceptibilities. Following an invited talk at the British Contact Lens Association in 2019, the Vice President and Chief Medical Officer of Bausch and Lomb visited UWS to discuss AK prevention, resulting in signing of a non-disclosure agreement; this enabled Bausch and Lomb to fast track AK prevention and treatment innovations.

The Deteriorating Patient Theme aligned their research activities with the imperatives of the Scottish Government Patient Safety Programme to ensure research significance and reach within the Sepsis ICS. Strategic collaborations forged with the Scottish Ambulance Service were pivotal in accessing large data sets, and rigorous studies extending across paediatric cases to older populations maximised reach. With a growing reputation for ground breaking research in pre-hospital application of early warning, **Rooney** was appointed as the **Scottish Government clinical advisor on Sepsis**.

Slightly earlier in the impact journey, the BREATH (Border and Regions Airways Training Hub) schools-targeted public engagement is advancing a preventative approach to an incurable and fatal lung disease particularly prevalent within regions of Scotland and Ireland around our campus constituencies. Networking with key regional stakeholders including clinical teams, councils, schools, charities and politicians, is delivering transformative change to public awareness of chronic obstructive pulmonary disease (COPD) in target communities. Invited presentation on this research to the EU Parliament is indicative of external reach and relevance.

1.8 Interdisciplinary Research

Lockhart is Chair of the **BREATH** Management Board, governing international operations across the three partner institutions. Established in 2017 through the award of **EUR7,700,000 by the Special EU Programmes Board**, BREATH is an integrated, cross-border cluster of approximately 35 researchers trained to investigate the causes, treatment and prevention of COPD. Scotland and Ireland share some of the world's highest rates of COPD.

The UWS Vice Principal's GBP1,000,000 Research Support Fund was created (2018) to further promote cross-School interdisciplinary research. This was open to all staff and bid ranking was enhanced by ECR inclusion. Through this initiative 3 awards involving UoA3 submitted staff were made, investing **GBP156,000 funds** to establishing new programmatic research at UWS. Creating BREATH exemplified the success of this strategy, in establishing new interdisciplinary collaborations between environmental and biomedical scientists.

Tolson led a European team of researchers (nurses, physicians, mental health practitioners, sociologists, educationalists) in an impactful programme focussed on understanding the experience of advanced dementia, delineating care needs and producing a description of best practice for advanced dementia specific palliation called Palliare. Funded through an Erasmus+ Key Action2 Strategic Partnership award **(**GBP234,678), the **impact of Palliare has extended across Europe**, **Mexico and India;** including improved care, new quality grading systems and improved dementia education.

Ritchie and **Tolson,** along with legal, business and management academics, have led **pioneering research** investigating dementia in the workplace. A follow on dissemination grant from **Alzheimer Society** funded a series of four information pamphlets for **key stakeholders namely people with dementia, family, employers and work colleague**s.

1.9 Open Research Environment

Where appropriate, datasets for relevant studies are submitted to the **UK Data Archive** to promote preservation and accessibility of scientific data. We are establishing an open research environment and, where possible, funding applications include costs for **Gold Open Access publications** (e.g., BREATH budget). All accepted manuscripts are archived in the institutional online repository (UWS research portal), to comply with the **REF Open Access policy** and promoted on the staff PURE profiles, research websites and social media platforms.

In addition to **openness across the academic and scientific communities,** we proactively share our research findings in accessible formats to different audiences. Our dementia researchers for example work with the **National Dementia Carers Action Network** (family carers) and **Scottish Dementia Working Group** (people with dementia) to prepare accessible research reports in a variety of formats including podcasts, infographics, blogs and other 'lite bites'. IBEHR researchers disseminate their data as peer-reviewed articles and presentations at both national and international conference. Target audiences include scientists & clinical teams in relevant biomedical fields e.g., **European Respiratory Society**.

1.10 Research Integrity

The **UK Concordat to Support Research Integrity** shapes our research governance approaches and practices to good research conduct and both scientific and ethical integrity. IBEHR/IHCR culture is of research integrity and responsible research practices including authorship and all

forms of research dissemination. For collaborative research clear partnership agreements set out respective responsibilities and commitments, and where appropriate we embrace the European Code of Conduct for Research Integrity.

UWS expects all staff to demonstrate **commitment to the UWS Truths (values)** and is mindful of the difference between unintentional honest error and scientific misconduct, and the importance of respectful research mentorship.

Adherence to the **NMC Code of Practice** and other professional body regulator codes for practice based researchers is mandatory. Furthermore, **rights-based approaches** underpin all of our practice based and practice learning research. **Capacity legislation** and other frameworks to protect vulnerable people are particularly relevant to our researchers working in dementia and mental health, and familiarity with relevant legislative provisions is part of our determination of 'fitness to research' and the broader aspects of project risk assessments.

The **HLS Ethics Committee** provides a supportive framework for students and staff undertaking research with human participants. NHS and Social care partner research and development offices work cooperatively with us to provide advice on **ethical approval systems (e.g., IRAS), data protection and data securities**, providing access to relevant workshops and information session on changes. Staff undertaking research in forensic environments access training provided by The State Hospital and Scottish Prison Service relating to research and **research integrity and risks in secure environments**.

Accredited biomedical science programmes in the School train staff and students in quality and competence standards expected in **medical laboratories, as defined by ISO 15189**.

Animal-based research is governed by the **University's Animal Welfare and Ethical Review Board**, compliant with Home Office regulations (including National Centre of 3Rs policy), is guided by engagement with the Laboratory Animal Science Association, and ultimately published in line with ARRIVE guidelines.

Data storage processes and practice are GDPR compliant.

1.11 Strategy: Next Five Years

The primary goal of our research strategy for the next five years is to build upon the excellent progress made to date on our thematic research areas of strength, moving towards interdisciplinary research programmes that extend across biomedical sciences to applied practice based sciences.

Application of our research in terms of **practice** and **policy impact** is paramount to UOA3 strategic directions, as are the implications of novel discoveries to the **advancement of health, care and biomedical sciences** in their potential for societal benefit. A grounding principle will be to progress research that addresses the UN SDGs; particularly focussed on Goal 3 (Health and wellbeing) and Goal 10 (Equality). Our future strategic research aims are contextualised and reprioritised within the current peri-COVID-19 period.

Future strategic research priorities and actions are to:

- enhance our distinctive portfolio of UOA3 related research by building on our existing thematic areas of established and emerging strengths linked to nationally and globally identified priorities, mindful of integration and flow of research into our major teaching programmes and the strategic priorities of key external stakeholders and research funders.
- deploy our research excellence to address UN SDGs including COVID-19 recovery.
- refresh in line with the University 2025 Strategy research institutes and groupings to create integrated research teams (bench to practice) and provide career enhancing research

opportunities and researcher development to support the ambitions of ECRs, aspiring research leaders and exploring clinical academic careers.
- grow PGR student numbers alongside supervisory capacity and capability development.
- increase strategic partnerships with industry, policy makers, national health and care agencies, service providers, and NGOs to strengthen our research excellence with impact agenda.
- diversify our portfolio of research funders with further growth in research awards to strengthen our critical mass of research activity.
- embed an inclusive culture of research activity and innovation across *all staff*.

2. People

2.1 Staff Development Strategy

Research capability building, ECR development and preparing future leaders is integral to our staff agenda and academic strategy. Our growth strategy for practice based researchers has enabled an impressive **sevenfold increase** (21 cf. 3 in REF2014), and also steady growth to be maintained in biomedical research active staff numbers supported by an expanding pool of ECRs.

The School ensures that **study leave arrangements are incorporated within individual staff workloads**, equating to 21 days study leave, up to GBP1,000 to support consumable costs per year, in addition to GBP1,000 across the 3 years of a period of full time PhD study (pro-rata for part time) to support conferences.

In addition to investment in staff to complete doctoral research degrees (approximately GBP235,000), a further GBP84,512 has been invested in staff training, recruitment and welfare. Unpaid sabbaticals are fully supported and the unit currently has one staff member on sabbatical leave.

The **University appraisal scheme,** MyContribution, is completed annually with interim 6 month review. This incorporates objective setting for learning, teaching, research, enterprise and consultancy, staff development and conference attendance. Through MyContribution, we proactively support all staff to assess and value their current contribution and to proactively plan their personal and professional development specifically including research. Requests for internal and external development courses, and other CPD opportunities are managed through the Dean's Executive Group, ensuring equity.

2.2 Staffing and Recruitment

The School's staff recruitment strategy ensures **equality, fairness and process transparency**. This is in line with the UWS strategic position to achieve sustainability, growth and embedded researcher career pathways, with a particular focus on ECRs. Wherever possible we appoint staff that are Doctoral qualified; this presents a greater challenge within IHCR than IBEHR.
The University **promotions round** is **merit based**, and not dependent upon a vacancy availability. In the last promotions round (2019/20) six UOA3 staff were promoted from Lecturer to either Senior Lecturer or Reader.

New or replacement positions are filled with a range of staff from ECRs to Readers/ Professors to ensure a balanced staffing base to effectively advance research and learning and teaching excellence.

2.3 Support for Early Career Researchers

ECR researcher development opportunities are aligned with the UK Vitae Researcher Development Framework. Since 2017, a total of **15 HLS staff have completed** the **UWS Grant Accelerator Scheme**, designed to improve grant application success.
Eleven staff have completed the more intensive UWS Crucible, modelled on the successful external Scottish Crucible; instrumental in **Papadopoulou** securing her first major grant **(GBP90,000 Burdett Trust**) and **Ritchie's Alzheimer Society** success of **GBP256,695** (awarded March 2021- delayed by pandemic). We are currently supporting eight colleagues to complete the

2020 UWS Crucible programme; this includes **MacRae** who recently secured **GBP115,000** from the **Dunhill Medical Trust**.

Two staff have completed **UWS Propel**, which has contributed to KTP success.

The **UWS Professoriate group** play a crucial role in mentoring ECR development, and the **UWS Research Staff Forum** enables interdisciplinary networking and research collaborations.

The School actively support the ECR conference and the **University Learning, Teaching and Research Conference,** and typically provides the **highest number of active participants/presenters.**

Two mechanisms overseen by IHCR-IBEHR directly support researcher development, namely the Project Panel and the Authors Writing Group. The intention is to achieve balance between robust peer review and collegiate support, particularly for ECRs. The monthly Authors Writing Group provides a safe space for aspiring authors to receive critical peer review from the early stages of manuscript outline and target journal selection, through to submission.

2.4 Academic-Industry Exchange

The BREATH doctoral training is industry led through **collaboration with Teva** (presented full-day training sessions), **Glaxo Smith & Kline** (two day invited visit to Stevenage site), **Chiesi** (sponsored ENGAGE Plenary talks by external experts) and **AstraZeneca** (provision of lead compounds; Dr Hultin PhD co-supervision; invited seminar at UWS).

BREATH has a **Clinical Affiliate scheme** to formalise collaborations with clinical colleagues; to date **7 clinical affiliates** have been appointed through UWS. These include respiratory consultants and nurses from NHS Trusts (Ayr & Arran, Dumfries & Galloway; Greater Glasgow & Clyde) who provide clinical perspective and expertise, have presented at our BREATH seminar series and critically provide access to clinical samples driving COPD research. Moreover, three of the Clinical Affiliates delivered a summer BREATH webinar series of well-attended public sessions on COVID-19 Pneumonia. This includes **Dr Bayes**, recently awarded a **CSO fellowship for her clinical research collaboratively linked to BREATH as an enabling platform**. Furthermore, additional SEUPB Funding (EUR400,000) has now been awarded specifically to consolidate and sustain BREATH clinical partnerships, enabling access to patient tissue from lung resections to drive our programme of doctoral projects elucidating pathogenic mechanisms in COPD.

In 2017 we hosted a visit from the **Kraft Foundation** to UWS, culminating in collaboratively establishing My Home Life Germany to progress culture change and research informed practice within nursing homes.

The Alzheimer Scotland Dementia Nurse Consultant from **NHS Ayrshire and Arran** is seconded one day per week to work with ASCPP. A 0.5 FTE secondment of a Forensic Mental Health Nurse Consultant from **The State Hospital** has augmented our relationships with this **special health board**, and provided leverage for seedcorn funding critical to establishing innovative forensic mental health research.

The Scottish Fire and Rescue Service, Police Scotland, the Scottish Ambulance Service, Alzheimer Scotland and UWS formed the **'Dementia and Emergency Services Collaborative'** in 2017, signing the **Emergency Services 2025 Dementia Pledge** to improve safety of people with dementia. UWS has supported the Fire Service to kit out a simulated flat drawing upon our DOMUS suite technologies, and provided dementia simulation based training within the Living Lab. Reciprocated fire and rescue simulations in their new dementia flat provided understanding and impetus to a new area of research 'keeping a person with dementia safe'.

2.5 Research and Impact Awards

Current staff without a PhD are supported to gain a doctoral qualification and become active researchers. During the REF period some **45 academics have been supported to study part-**

time (21 days study leave and fees paid). The **University Reward and Incentive Schemes** is designed to reward outstanding contributions. Professors submitted to UOA3 were acknowledged to have made outstanding contributions to research and research impact, each receiving an unconsolidated bonus.
The Staff Appreciation and Reward Scheme (STARS) was created specifically to recognise outstanding staff contribution. This collegiate nomination scheme has to date seen 8 researchers nominated from this submission, 1 receiving **'Excellence Award for Research & Enterprise'**, another for **'Outstanding Service to Colleagues',** and 2 further being awarded **'Highly Commended'** for research leadership**.**

Annual awards bestowed by our partner organisation Alzheimer Scotland have been received by several project teams and **Brown** has received a **Life Time Achievement Award** for contribution to dementia care.

Staff are supported to complete HEA Fellowships, with **Lewitt**, **Rankin** and **Tolson** achieving **Principal Fellow Status (PFHEA)** for strategic leadership in higher education including research and research teaching leadership. All PGR students have the opportunity to pursue Associate Fellow Status.

2.6 Research Students
During this REF period there have been 61 verifiable doctoral completions associated with UOA3 (31 submitted to REF4a). **Currently there are 71 doctoral students** being supervised by staff affiliated to the three Institutes, and another 15 students undertaking MRES/MPhil in the **pipeline for doctoral studies.** This group includes externally funded studentships (Abbeyfield Society, Erskine-Alzheimer Scotland, SEUPB, Carnegie Trust, Bangabandhu Overseas Scholarship (Bangladesh)).

The School PGR Lead and Doctoral College Board Deputy Chair, **Young**, manages admissions to research degree programmes (MRES, MPhil, PhD) in liaison with Institute Directors and potential supervisors. Each Division has a named post graduate research coordinator to augment local processes and support student led initiatives including online Cafes and PGR Student Parlez. Above sector levels of PGR engagement with PRES (2017/18 83.4% response rate) reflects a thriving research learning community and culture.

The UWS BREATH team is led by **Lockhart**, **Litherland** and **Crilly**, supported by 2 PDRA/RAs and 1 Research Technician, and built around a central doctoral training hub currently supervising 7 UWS and 12 partner PhD students. Student recruitment, placements and progression are monitored and managed by a Scientific Supervisory Board which meets bi-annually, comprising all ten Principal Investigators across three partner institutions. All students are supervised jointly by cross-border supervisory teams, and gather to present at annual BREATH conferences, hosted by respective institutions, in addition to national and international conferences. Engagement in webinars across partners presented by experts in the field is facilitated via Teams platforms. Students are also funded to undergo placements in partner institutions and/or industrial collaborators, this has included an invited 2 day site visit at GSK main site in Stevenage (2019) – an opportunity extended to PhD students across HLS. All students actively participate in the BREATH Public Engagement and Outreach programme, all as STEM Ambassadors.

The doctoral programme has enabled **engagement of academic with relevant expertise across respective Schools as supervisors on doctoral projects**: e.g. **MacKenzie** (airway smooth muscle), **McLellan** and **Hursthouse** (UOA7; air pollution), and **Mackay** (microbiology). This programme expansion was supported by 3 additional matching PhD studentships funded by the **UWS Vice Principal GBP1,000,000 Funding Scheme**.

PGR students preparing dementia related thesis are part of the Alzheimer Scotland Centre for Policy and Practice at UWS, benefitting from **full access to Alzheimer Scotland development opportunities** and activities, and are active members of the more clinically focussed Alzheimer Scotland Centre at the **University of Edinburgh PGR Journal Club**. Opportunities to **publish**

with supervisors are encouraged, for example two recent PhD graduates co-authored chapters in our most recent dementia text book (Jackson and Tolson, 2019). They are supported to develop connections with the Scottish Dementia Working Group (people with dementia) and the National Dementia Carers Action Group (family carers), and avail themselves of the resources and expertise of Alzheimer Scotland and free **membership of the Scottish Dementia Research Consortium**. Three of our PGR full time students, and one member of staff undertaking a dementia related doctorate, have secured SDRC **COVID-19 mitigation awards** worth approximately GBP2,000 each, to support changes required due to pandemic related impacts.
Supervisor development involves a combination of School led and Doctoral College training. Monthly IHCR Supervisor Forums provide peer to peer support, **sharing of best practice** and reflection on supervisory dilemmas.

Annual IHCR **student led research conferences** provide invaluable professional and research learning experiences. Similarly, IBEHR's **annual research engagement conferences** encourages staff and PGR student interaction. In 2018, with the formation of HLS, integrated **ECR led research symposiums** were introduced.

2.7 Equality and Diversity
The School applies all University equality, diversity and inclusion strategies and processes to create a diverse and inclusive research culture. All researchers complete **Unconscious Bias Training** and relevant research integrity training. The Dean sits on the **University Equality, Diversity & Inclusion Committee** and ensures updates are cascaded quickly to all staff. Commitment to disability equality is reflected in our staff playing a key role in the development of a **Disability Staff Network**. **Staff who have** disabilities are supported through **Occupational Health** to access assistive technology and equipment to ensure that the research environment is inclusive.

Two thirds of our 33 Cat A returned researchers are female, one third male. **Staff on parental leave** have optional **'keeping in touch' days**, popular with those who have delegated research project leadership. The School also employs a replacement member of staff to back-fill long-term absences. We encourage **staff returning from parental leave to apply for funds from the Returners Scheme to support the re-establishment of their research** following a period of absence from the University. Several staff from within the School of HLS have been successful in obtaining up to **GBP10,000 to support the re-establishment of research**.

The School supports all staff with **flexible working** arrangements where the business need can support this. Currently 18.6% of all academic staff work flexible hours (full time staff 21.6%).

The University **annual promotion round ensures all applications are viewed equally irrespective of status, mode of work, or protected characteristics.** Of those returned in this submission, research accomplishments contributed to the promotion of six female and four male academics: two advancing to Reader and four to Professor, including one part-time female. **Ten staff have completed the Aurora Women in Leadership Programme**.

We aspire to be a diverse and inclusive research community and 4 of the Cat A IBEHR staff are from ethnic minority communities. The age range of our Cat A staff extends from 37 to 68 years. Nineteen of our researchers are aged 50 years or older. Our future strategies include succession planning and **growing the number of younger research active academics** (less than 35 years old).

The University in 19/20 developed criteria including equality and diversity that allows individuals to apply for **promotion from Lecturer A to Lecturer B** and encourage staff to seek promotion via this route, as well as any Lecturer B post advertised.

School support for staff also includes meeting the requirements through study and staff development to move across roles and grades. An example of this is the **movement of RAs into a Lecturer A role,** the aim being they subsequently undertake Doctoral studies to enable their

application for further promotion. The **same opportunities are available for technical staff**, enabling them to study and develop their careers (including as academics).

3. Income, infrastructure and facilities

3.1 Research Income and Funding Strategy

Over the current REF period, the collective research grant awarded to the Unit staff **exceeds GBP11,700,000**, with **approximately GBP6,000,000** administered through UWS since 2014. This represents **a 95% uplift** from REF2014, and equates to **GBP354,000 total external income per staff FTE**.

IBEHR staff in UOA3 has been awarded **approximately GBP7,600,000** in total external research income since 2014, of which **GBP2,100,000** was administered through UWS. Sources of these funds include a diversity of prestigious research organisations. Key awards include from research charities such as Versus Arthritis, Carnegie Trust, Medical Research Scotland, Tenovus, etc. Support from industry includes AstraZeneca, GlaxoSmithKline, Chiesi, and Teva UK.

The focus on securing substantial programme research funding has proved successful in continuing to raise the level of biomedical research at UWS. A **5 year GBP1,200,000 Arthritis Research UK Programme award** (2012-18) added further dimensions and value to the central multi-institutional programme by attracting new high calibre research staff and related satellite grant funding. The bar was further raised by the **5 year EUR7,700,000 SEUPB award** (2017-2021) to create an international PhD training hub (BREATH) partnered with institutions in Ireland and Northern Ireland. The embedded BREATH Affiliate scheme has expanded the core research body (approximately 50) by attracting clinical and academics partners, part-supported by GBP141,000 awarded through the UWS Vice Principal GBP1,000,000 Funding Scheme, facilitating clinical research bids (Bayes, CSO awarded 2021).

Building on REF2014 success, IBEHR embedded 8 previously appointed ECRs into respective research groups, their deployment accelerated by targeted IBEHR funding e.g., all were awarded UWS PhD studentships, allocated an IBEHR-ECR budget of GBP8,000 per year, and encouraged to apply for the IBEHR Open Bid and Matching funds (GBP60,000 per year) available competitively to all institute staff. Development at group level was also promoted by allocation of an annual operating budget (GBP2,000 per year per group). IBEHR (then School/UWS) funds also covered membership in relevant Institutes (SULSA, SAGES, MASTS). From 2018 (inclusive) the research institute budgets were pooled into the Vice Principal GBP1,000,000 Bidding Scheme.

IHCR staff in UOA3 have been awarded **GBP4,000,000** in total external research income since 2014, of which **GBP3,900,000** was administered through UWS.

The IHCR strategy focussed on incrementally securing monies to establish project clusters with thematic purpose. Funding success with a combination of standard project applications, small research grants and incentive schemes, industry funding and partnerships funding for innovative practice and pilot initiatives, has purposefully positioned teams for more ambitious future applications. Key examples include Arts & Humanities Research Council, Chief Scientist Office, Erasmus+, Laerdal Foundation, Abbotts Point of Care, and charities including Alzheimer's Society, Alzheimer Scotland, Burdett Foundation, Healthcare Improvement Scotland NHS Trust, Dunhill Medical Trust, and Life Changes Trust.

3.2 Organisational Investment

Dedicated research laboratories and facilities are specifically tailored, managed and maintained to support the breadth and integration of biomedical and nursing research across the School. This includes investment of almost **GBP4,500,000** in science laboratories and research spaces at the **award-winning New Lanarkshire Campus** (2019 Guardian's University Award for 'Sustainable buildings that inspire'). This includes Research & Infection Control Lab (GBP374,727) and the Lanarkshire Living Lab suite including DOMUS costing GBP280,694.

3.3 Support Staffing and Infrastructure

The School has, over the course of a number of research funded projects, employed fixed term RTs, RAs, PDRAs and Admin staff to support research. These dedicated posts are appointed to meet the specific requirements of the research. As part of the rebalancing project undertaken by the University in 18/19 and 19/20, the School saw the introduction of Grade 5 technicians and a change in job descriptions for technicians at other grades to ensure research was better

supported, along with the appointment of research technicians. The benefit this has afforded is only beginning to be realised due to the current pandemic and the requirement to have 'essential only' work ongoing on campus. Longer term the technical team will significantly enhance research support. Additional support is provided by identified members of the School Admin staff pool, for example in arranging conference attendance, ordering of consumables, etc.

3.4 Specialist Research Infrastructure for Impact

Biomedical research facilities support IBEHR expertise in molecular, cellular and systems biology to dissect the pathogenic mechanisms driving inflammatory disease (arthritis and COPD). The infrastructure in place enables the arthritis programmes to extend from *in vivo* models, through molecular and cellular studies, to translational research, with access to tissues obtained from arthritis patients at arthroplasty, buffy coats (Blood Transfusion Service) and patient blood. Translational COPD research is similarly enabled by access to patient bronchial brush/wash and sputum samples from BREATH partnered bronchoscopy clinics (NHS Ayrshire & Arran; NHS Greater Glasgow & Clyde, NHS Dumfries & Galloway), as well as surgical resection tissue. Dedicated facilities have been tailored specifically for this research, recently expanded for and funded by the BREATH COPD programme and UWS. These include: A histology suite including automated cell stainer, upgraded (2017) to include Zeiss Axioscan Z.1 slide scanner, automated microtome (Thermo) and Leica cryostat; Expanded/upgraded tissue culture suite including oxygen level control; Molecular analysis enhanced (2017) by Thermo Varioskan Lux multimode plate reader; Home Office licensed animal facilities, upgraded (2017) with compact anaesthesia system; Breeding colonies of genetically modified (e.g. F2rl1-/-) mice supporting arthritis and COPD research (through new BREATH Project Licence); Flow cytometry suite; Extracellular matrix biochemical analysis system*; in vivo* and *in vitro* vascular assessment suites.

The Lanarkshire Living Lab includes a generic studio styled flexible research and innovation environment, DOMUS and a specialist infection control suite. The generic Living Lab can be used as a creative space to engage the public in research and can be quickly transformed using pop up simulations such as our 'pop up pub' which has been used in football reminiscence research or as a sensory simulation zone or a dementia simulation experience. The award winning **DOMUS Facility** is a simulated domestic environment where we explore low and high tech aids for living and care, and experience design that both helps and hinders care in the family home. Adjacent to the DOMUS are the Acorn Primary Care Unit, hospital simulation units. These suites have continuous video recording facilities, viewing windows and remote audio and voice connections. All of these facilities are shared learning and research spaces.

The **Living Lab Infection Control Suite** provides facilities to test and pilot infection control interventions in a safe setting away from healthcare. The lab is situated within state-of-the-art containment level 2 (CL2) facilities that allow for the safe trial of disinfectants and other interventions against common healthcare associated infection causing pathogens. The facilities are built to healthcare specification and include functional handwashing, bathing and toilet facilities. The facility is of particular importance to the testing of disinfectants and personal protective equipment such as face masks under in-use conditions. Current partners include commercial companies and the NHS. Current projects include face mask testing, biological spill kit testing and research into the spread and persistence of pathogens in the healthcare setting.

Microbiology research is supported by level II containment facilities, a suite of new environmentally controlled rooms (Lanarkshire) and specialised technologies including High resolution Scanning Electron Microscopy, x-ray powder diffraction, and Spatial and Pattern Analysis Research laboratory. A dedicated Advanced Chemical Instrumentation Laboratory is used for bio/geoscience applications, underpinning relevant projects including the impact of metal air pollutants on human tissue.

3.5 Cross-HEI Infrastructure Collaboration

As an integral part of an established cross-institution collaboration with the University of Glasgow, CMS has assigned laboratory space and offices on University of Glasgow campus, and access to state-of-the-art core facilities in the Institute of Infection, Immunology and Inflammation (directed by **Professor McInnes**) which include IVIS *in vivo* imaging technology. This supports CMS staff with Visiting Professor (**Lockhart**) or Honorary Lecturer (**Crilly**, **Litherland**) status at the University of Glasgow. Through the Arthritis Research UK Programme consortium, CMS links with

the bone group in Edinburgh University for comprehensive bone analyses (μCT and histomorphometry) and with Newcastle University for matrix biology research. The tripartite BREATH doctoral training hub includes student placements at partner institutions to utilise their specialised facilities. These include patch clamping and cell calcium imaging at Dundalk Institute of Technology, and a state-of-the-art imaging suite at Queen's University Belfast. The latter is comprised of transmission electron microscopy and high throughput fluorescent imaging assays, to analyse cellular membrane processes and ion channel function respectively.
Professors McInnes (Glasgow), **Goodyear** (Glasgow), **Plevin** (Strathclyde), **Rowan** (Newcastle), **van 't Hof** (Liverpool), **Ferrell** (Glasgow), **Roberts** (Strathclyde) and **McGarvey** (QUB) are all currently appointed as Visiting Professors at UWS (IBEHR). **Professor Goodyear** is co-head of the cross-institutional Centre for Musculoskeletal Science, and is co-supervisor on 6 ongoing and 5 completed PhD projects, through his expertise in immunology, osteoclasts and B cells. **Professor McGarvey** also co-supervises 12 BREATH students, including 3 at UWS.

3.6 In-kind Benefits
Teva UK, Chiesi and GlaxoSmithKline each contributed training sessions to BREATH researchers, with sessions being opened to all interested researchers (staff and students) in the partner institutions. **NHS Dumfries & Galloway** funded the catering to support the BREATH Stakeholder Launch Event in Crichton campus, Dumfries (2017), which paved the way to establishing BREATH impactful engagement in Dumfries & Galloway. Dr Leif Hulten (AstraZeneca) also provides time, materials and supervisory support for arthritis and BREATH doctoral students.
Alzheimer Scotland has donated state of the art digital enabling technology (IPD controlled ring video doorbell, Echo Show, Wiwe ECG Monitor, pressure sensor mats, Philip Hue smart bulbs and plugs) worth approximately GBP1,000 for our DOMUS facility at our Lanarkshire Campus. Eight simulation ageing suites, each worth GBP2,000 have been received through philanthropic donation.
Alzheimer Scotland staff are periodically seconded to the Centre for specific research activities, and we are working to support their staff and volunteers to understand the foundations of research and what it means to become involved or to participate in research.

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

4.1 Research Collaborations, Networks and Partnerships
We proactively seek research collaborations (UK and international), embrace meaningful user involvement, target engagement with key networks and where opportunity exists establish new networks.
Dementia Research benefits from a strategic partnership with **Alzheimer Scotland**, and executive leadership positions **(Tolson** and **Ritchie)** with the **Scottish Dementia Research Consortium (SDRC),** the **Alzheimer Scotland Centre for Policy and Practice (ASCPP) at UWS,** is underpinned by a strategic partnership agreement. SDRC is a Scotland wide network of researchers from all disciplines and institutes engaged in all forms of dementia research.

Jack-Waugh, and **Brown's** membership of the **UK Higher Education Dementia Network (HEDN)** is testimony to national standing in **Learning for Practice Dementia Research**. Sustained research connections with **Erskine** (veterans care) began with a small externally funded study and has progressed to an **Erskine-Alzheimer Scotland funded PhD studentship.**

MacRae's Visiting Research Scholarship with the **University of Saskatchewan, Canada** (2017 onwards) has been pivotal to research collaborations **funded by the Canadian Institute for Health Research**. These include dementia workforce development projects with **six Canadian Universities** and a project developing an APP to support mental health of rural caregivers of persons with dementia in collaboration with **RuralCARES in Canada**.

Memorandum of Understanding with **Manipal Academy of Higher Education (MAHE) College of Nursing, India,** developed from an initial **Scottish Funding Council Global Research Challenge** funded project exploring **dementia related hardships in India,** provides the

foundations for a continuing collaborative research and research mentoring relationship**.**

A **British Society of Gerontology** funded 'Dementia & Multi-Species Caring' workshop in May 2019 led to **The Wellcome Trust award** (GBP30,000) **to establish the Multi-species Dementia Network** in 2019.
Our Global Mental Health Researchers (led by **Lusher**) are collaborating with the **Mental Health and Wellness (MEHEWE)** and **University of Washington.** This important work investigating the **psychological impact of COVID-19** is being undertaken with research teams from **USA, UK, Ethiopia, Nigeria and Egypt**, our involvement serving testimony to UWS commitment to global benefit.
A strategic partnership with **The State Hospital (Carstairs)** and **Forensic Network** has propelled development of forensic **Mental Health Research**. **Deteriorating Patient Research** was pivotal to the work of the **National Sepsis Collaborative** and **Acute Adult Programme** of the Scottish Government's Scottish Patient Safety Programme.
Rankin is part of an **international research** cooperative to advance rural midwifery practice collaboration with New Zealand midwifery leaders. This collaboration includes **Robert Gordon University (UK), Auckland University of Technology,** and **Ara Institute of Canterbury (NZ),** and undertakes international comparisons of midwifery practice**.**
IBEHR has an established highly integrated GBP1,200,000 Arthritis Research UK programme of research **with centres of expertise across four other UK universities (Glasgow, Strathclyde, Newcastle, Liverpool).** This includes UWS partnership with two recipients of the **prestigious EULAR Centres of Excellence award,** and supports movement of staff and PGR students between institutes for research and training. This consortium comprehensively researches osteoarthritis at molecular, cellular and system levels, spanning the pathogenesis of osteoarthritis from its inception, through protease-mediated signaling via a key receptor (PAR2), to joint pathology.
The multi-prize winning BREATH consortium is forged from a formal UWS partnership with **Dundalk Institute of Technology**, and **Queen's University Belfast**, and consists of a joint Management Board, combined annual BREATH conferences together with co-hosted webinar series and formal placements for PhD students with partner laboratories. The partnership further includes Professor Goodyear (**University of Glasgow**) and Dr Elaine Emmerson (**University of Edinburgh**).

Scottish Universities Life Alliance (SULSA) was created to link **eleven universities** to advance the national research and innovation in the life science sector. UWS has been a member since 2018 and early successes include GBP13,898 SULSA funds to support 3 ECR projects. Dr Menzies is a Scientific Theme Advisor for SULSA.
Infection control researchers including **Mackay** collaborate **with NHS and Scottish Ambulance Service** to promote patient and staff safety through near patient surfaces, uniform and ambulance decontamination studies.

4.2 Engagement with Users, Beneficiaries and Communities
The BREATH public engagement programme exemplifies community partnership approaches within Dumfries & Galloway, and Ayrshire & Arran, where COPD-related hospital admission is amongst the highest in the UK. Since 2018 UWS has educated over 5,000 young people across these regions through links with the respective councils, and key teaching/RAiSE contacts. This has raised public awareness regarding COPD in recognised hotspots of the disease, and educated children on lung health and the dangers of smoking. Our programme included active patient and MSP involvement in engagement sessions across approximately 50 schools, been featured in national (Scotsman, 2017; Sunday Post, 2020) and regional news outlets (e.g., Galloway News, Free Press, Dumfries & Galloway Standard, Carrick Gazette; 2017-20), broadcasted on radio (Westsound Radio, 2018), been subject of two international case studies published by the SEUPB, and also featured in their YOUR EU e-zines (2018, 2019). This has been supported by a social media campaign via our Twitter (15-20,000 impressions per month), Facebook, and Instagram platforms, as well as a dedicated BREATH webpage (breath-copd.org). **Lockhart** also gave an invited presentation on the BREATH plan to combat COPD in Scotland,

Ireland and Northern Ireland as part of an SEUPB **Showcase at EU Parliament** in Brussels (Dec 2017).
Since 2019, we have been exploring with members of the **Scottish Dementia Working Group (SDWG; people with dementia)** what would be useful in terms of connecting with the research community. We are working with SDWG to refresh a publication setting out their preferred empowering approach to research involvement to address 'research fatigue' arising from excessive requests for tokenistic involvement**.**

In 2019 we established a **Research Group with the National Dementia Carers Action Network (family carers),** and **as co-researchers** we have agreed priority topics and submitted a funding application for a studentship.

Highlights of dementia research media coverage include: **Hungarian National TV Documentary** (2014- with **Tolson**), **BBC Wales Primetime Documentary Beti and David** (2017 with **Brown** and **Jack-Waugh**), BBC Radio features include Scotland Drive Time (**Ritchie** - dementia employment, 2015), Janice Forsythe Culture Show (2016 - **Watchman**) – Grace Notes project, a Series of five Dementia Experience broadcasts (2017) presenters Kaye Adams, John Beattie and people with dementia and Czech National Radio featured our advanced dementia research (2015). Newspaper coverage has included features in Sunday Herald, The Herald, Evening Times, Prague Daily Monitor (2015), Diario Información (2016) (regional press Spain) and The Times India (2019), plus various short reports in local newspapers and charity news.

We have proactively shared our research through the **Glasgow Science Festival (2017-2020, inclusive)**, typically attended by approximately 350 visitors, the Prince's Trust Dumfries House STEM Day (2019), **Super Science Festival (2019**) and the **Prestwick Aerospace STEM Week (2017)**. In 2019 the dementia care team collaborated with the newer **Biggar Science Festival**, with sessions designed to show case the impact of research on the lives of rural communities.

4.3 Contribution to Economy and Society
Our acute deterioration research team led by **Rooney** (Cat B), collaborating with the Scottish Ambulance Service and pre-hospital practitioners, has validated early warning scores for use in adults and children in pre-hospital settings. **Research impact has contributed to a 21% reduction in sepsis mortality and a 31% reduction in cardiac arrests in Scotland**. Development of an innovative APP has supported uptake in practice.
We have redeployed our infection expertise to **understand SARS-CoV2 transmission,** growing a surrogate animal coronavirus with similar properties to SARS-CoV2. Assays have been developed for disinfectants testing against the surrogate SARS-CoV2 as well as disinfectant efficacy in healthcare, community settings and dentistry. We are first to pioneer a novel virus capture from the environment assay that is allowing the study of how virus particles are released from human breath and can dissipate in the environment.
Our decontamination studies confirmed the effectiveness of current laundering equipment, saving the **Scottish Ambulance Service** approximately GBP700,000. Together with industry, we established protocols to test their methods of fogging and spraying disinfectant to effectively kill pathogens such as MRSA, extended-spectrum β-lactamase (ESBL)-producing *Klebsiella pneumoniae* (ESBLK) and carbapenemase-producing *Enterobacterales* (CPE): pathogens considered of "critical" or "high" priority by WHO.
BREATH research has been highlighted in **three Scottish Parliament debates**, showcased at **EU Parliament** (2017) and our public engagement featured as the subject of SEUPB case studies. Relationship building with district councils and regional parliamentarians (Harper, Carson, Whitford) has been key to this outreach, with patient ambassadors offering particular engagement value. BREATH academics (Lockhart, Crilly, Litherland) are invited members of the Scottish Parliament Cross Party on Lung Health, and presented the BREATH mission at the September 2020 CPG meeting. The BREATH doctoral training is industry led through collaboration with relevant pharmaceutical and biomedical companies, providing future recruitment opportunities for the students, and additional funding routes.

Our advanced dementia research informed **the Fair Care Commission (chaired by McLeish -**

former First Minister). The resulting major Alzheimer Scotland campaign has secured support from over 15,000 members of the public, and has been debated by Scottish Parliament. In January 2021, a Scottish Government policy recommendation called for a 7.5% increase in Nursing and Free Personal Care Allowance, the first increase since introduction in 2002 and a step towards fairer dementia care.

Being Home research led by **Brown's** team, which included chartered surveyor and building design specialists, investigated housing for people with dementia, and was cited as a core driver for the **2019 Scottish Housing and Dementia Framework Guidelines** published by the Chartered Institute of Housing (cih.org). *Being Home* was the focus of a **Parliamentary Reception** presented at the cross-party Dementia Group and subsequently sent by the Cross Party Chair to **all Local Authorities in Scotland as a catalyst for change**. Building upon *Being Home,* we secured a **Dementia and Housing Abbeyfield Studentship** (GBP61,000) and are currently researching the contribution of supportive housing.

Our dementia education research has been instrumental in repeat commissions to deliver the **Scottish Government flagship Dementia Champions workforce development programme**. Dementia Champions is recognised as **one of the UK's 100 best breakthroughs by MadeAtUni** for its significant impact on people's everyday lives. To date, working in partnership with **NHS Education Scotland, Scottish Social Services Council and Alzheimer Scotland,** we have graduated 1,000 Dementia Champions, preparing them to lead practice-based changes throughout the NHS in Scotland.

With **NHS Ayrshire and Arran** and **Alzheimer Scotland,** we have collaboratively piloted an **innovative Carers' Academy** which is focused on supporting fundamentals of dementia care skills development. This award winning model has been described by family carers ***'as a life line'*,** 'the difference between just getting by and knowing we can continue'. To mitigate COVID-19 related disruptions, we are moving this to the Alzheimer Scotland Virtual Resource Centre and in the longer term plan to offer as a blended model and extend provision across Scotland.

4.4 Discipline, Interdisciplinary and International Priorities

Our **strategic research focus on 21st Century major public health challenges** of progressive and enduring conditions (COPD, dementia, mental health) and life threatening deteriorations (including sepsis), **aligns with both global health priorities and national priorities**. The multifactorial nature of these conditions and impact upon the lives of individuals, their families and society, **addresses two of the UN SDGs. Through our research we support healthy lives and promote well-being for all at all ages** (goal 3), and **reduce inequality within and among countries** (goal 10).

The vision of the **WHO Special Initiative for Mental Health (2019-2023)** is that all people achieve the highest standard of mental health and well-being. We are contributing directly to this imperative through studies on global mental health, patient and carer stress and forensic mental health. Dementia studies flow from the **WHO Global Dementia Action Plan (2017-2023**) with its focus of high quality care and positive living. Specifically, we have both influenced and responded to the strategic imperatives set out in **Scotland's three national Dementia Strategies** and **rights-based charter of care**. Learning for practice research transcends several areas and ensures state of the art approaches, and importantly in the peri-pandemic period, **trauma informed approaches** (**Taylor**).

Through expertise and focus on degenerative conditions and rapid deteriorations we are well placed to respond and deliver a **challenge driven research agenda** which features the "leave no one behind message" of the six **SDG Transformations**, coupled with the detailed provisions of the Scottish, UK and international **COVID-19 Recovery and Resilience Action Plans**. Hidden impact reports demonstrate faster dementia deteriorations, escalations of family carer distress, substantial decline in mental health across all ages and an urgent need to understand best approaches in reducing COVID-19 transmission.

UWS is justifiably proud that its advanced dementia research was **selected by the Royal College of Nursing UK** to demonstrate in the RCN Fellows Project how **nurse led research is addressing the UN SDGs here in the UK and internationally** (Tolson, 2020). A commission for

six papers by Nursing Older People Journal focussed on state-of-the-art advanced dementia practice (Brown & Tolson, et. al., 2020), is further testimony to **discipline standing and influence**. Through two small SFC Global Reach Research awards we have collaboratively undertaken research to protect and support breast feeding in developing countries. This has culminated in establishing the **International Board of Lactation Consultants Examiners** (IBLCE) (**Chaired by Rankin)**, an inaugural interdisciplinary research initiative to protect and promote breastfeeding/infant nutrition in developing, low-income countries and in natural/emergency disaster situations.
BREATH forms a key element of the institution's ongoing prioritisation of international research by the creation of a **novel doctoral training hub**; this includes Ireland, receives EU funding, disseminates findings across Europe (YOUR EU Ezine) and **engages with EU policy and parliament**. International collaboration includes Dr Leif Hultin from **AstraZeneca (Sweden)**, who actively co-supervises PhD students in both our BREATH and arthritis programmes, and has visited UWS to deliver an IBEHR seminar.

4.5 Wider Influence and Contributions
During the census period **62 invited talks/keynotes** have been presented at **significant international conferences**. These include the **Global Alzheimer Research and Care Summit** (**Tolson**, Lisbon 2017), and **Europe's largest long term care sector conference** funded by the 'Together we change the World Foundation' (Tolson, Poland 2019; 1,000 delegates from 31 countries), and demonstrate international and long term care sector interest. The focus on advanced dementia was heralded by Polish industry organisers as a new and important direction for the long term care sector in Europe and a practice focussed call to action paper, based on our research, was circulated to a further 2,000 European care providers in three languages (English, Polish, Russian) https://mkod2019.syskonf.pl/?lang=en.
Since 2017, **MacRae** has been a Visiting Research Scholar with the **University of Saskatchewan, Canada.** An invited **Keynote, Public Lecture and Seminar Series** (MacRae, 2018/2019), funded through **Canadian Institute for Health Research Awards**, focussed on the potential for dementia policy transfer from Scotland and lessons from our research to Canada.
International external research related leadership contributions include Chairing the International Board of Lactation Consultant Examiners Research Committee (**Rankin**), membership of the Global School Nurse Consortium (a WHO Reference Group) since 2019 (**Astbury**) and invited membership of Alzheimer Europe Scientific Committee (**Tolson** 2014-current).
National research leadership contribution include membership of the GCHC Research Fund Steering Committee (**Rankin**), Scottish Neurological Seedcorn Fund Panel (**Tolson** 2019-current), Executive Member of the Scottish Dementia Informatics Board (**Tolson** 2018-current) and Executive Committee Scottish Dementia Research Consortium (**Tolson**, Lead for Living with Dementia Research Theme; **Ritchie**, Lead for Dementia ECR).
Other **external research committee contributions** include West of Scotland Research Ethics Committee 1 (**Fulford** 2016-2018), research advisor to Isle of Man Hospice (**MacRae**), Member of the Alzheimer Scotland Research Advisory Committee (**Tolson** 2013-current) and UWS representative for the Physiological Society (**Lockhart** 2015-current).
Brown and **Tolson** are active members of the **Cross Party Group on Dementia**, and have made invitational presentations about advanced dementia, housing and dementia research and the Being Home Report. **Lockhart** is a member of the **Cross Party Group on Lung Health** and showcased BREATH COPD research at the **EU Parliament**. **Tolson** is a on the **Register of Experts for the Scottish Parliament Information Centre (SPICe)**, and has reported on Dementia COVID-19 Harms.
Eleven of our researchers serve as **grant reviewers for twenty funders** including **MRC, BBSRC, ESRC, NIHR, Chief Scientist Office**, **UKRI Future Leaders Fellowships**, Society for the Study of Human Biology, Dunhill Medical Trust, The Carnegie Trust for the Universities of Scotland and Chilean Antarctic Institute.

Contributions to academic journals include, **2 editorial board memberships**, **social media editor**, and 18 staff reviewing for **73 peer review journals** including Scientific Reports, PLoS ONE, Nature Review Rheumatology, Journal of the American Medical Directors Association, Age

and Ageing, Ageing and Society, Nurse Education Today, International Journal of Nursing Studies and Journal of Advanced Nursing.
Research excellence has been recognised by submitted staff receiving the Lifetime Achievement Scotland's Dementia Award (**Brown**, 2016), Royal Society of Biology Researcher Outreach & Engagement Award (**Menzies**, 2017), Mental Health Nursing Forum Scotland Innovations in Education Award (**McCaig**, 2015, **Watchman** and **Tolson**, 2016), University of Aberdeen Certificate of Excellence Award for Research & Enterprise (**Rateb**, 2019), and being finalists for Guardian Scotswoman of the Year (**Tolson**, 2016) and Palliare Best International Project (**Tolson**, et. al., 2016).
BREATH gained early recognition for success in blending complementary research expertise to create a training hub (10 academics, 8 PDRAs, 19 PhD students), named the **Asthma and COPD Project of the Year** at the 2018 Northern Ireland Healthcare Awards, and received the **QUB Vice Chancellor 2020 Award** for Excellence in cross-partner integrated research culture.

In 2020, UWS was awarded an **Advanced HE Collaborative Award for Teaching Excellence (CATE)** 2020 for its ground breaking research based 'Class in a Bag' (Tolson et al). This a portable intergenerational education resource used by student nurses to teach school children about dementia. More than 10,000 school children have learned from over 2,400 nursing students about dementia and have pledged to be dementia positive citizens.
Tolson is a supervisor on the doctoral panels for two MAHE PhD students and is currently collaborating on a **study to explore the impact of COVID-19 on doctoral students registered with MAHE (India).**