

Institution: University of Southampton

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

1. Unit context and structure, research and impact strategy

1.1. Overview

Our world-leading interdisciplinary research transforms the quality and effectiveness of health and care services, providing evidence-based solutions to today's most pressing healthcare problems. Our findings have been applied nationally and internationally to inform guidance, create national standards, influence policy, and change practice with widespread impact. As a result, in 2020, for the second year in a row, QS ranked us 5th in the world for nursing and midwifery.

1.2 Structure and management

The School of Health Sciences encompasses two departments: Nursing, Midwifery & Health, and Allied Health Professions with four interdisciplinary research themes: '*Active Living*', '*Health Needs*', '*Fundamental Care*' and '*Health Work*', (Fig.1). The leadership, resources and expertise within each theme enable high quality applied research to thrive and nurture a vibrant and expanding research community. Named champions provide School-wide support for: early career researchers; equality, diversity and inclusion; clinical academic careers fellowships; research ethics; open science; outputs; and impact.



active programme of meetings, seminars, and PGR showcases; and hosting visiting international

academics to foster a stimulating intellectual environment. Research funded by our NIHR

Fig.1: Research themes, groups and research-active staff



Applied Research Collaboration (ARC) is integrated across the themes and extends our reach into the region through partnerships with NHS Trusts (§3).

Research strategy is led by the Deputy Head of School Research who chairs the School Research and Enterprise group – comprising leads from research groups and champions – and research support services (REF5a§1.5, 3.7).

1.3 Research strategy (2014-2021)

Building on our successful RAE in 2008, the unit's strategy prior to 2014 was to invest in *people* and *facilities*. This created the research framework and leadership needed to achieve an outstanding REF2014 result (ranked 3rd overall for GPA). Since 2014, our strategy has been to ensure the *sustainability* of our research themes through gaining key infrastructure grants and new platform awards (>£25M). We have built on our research strengths by developing talent across the four themes, to increase our volume of high-quality research and outputs, as well as their reach and significance. The achievements and successes that have resulted from this strategy are outlined in §1.5.

1.4 Impact strategy (2014-2021)

As a School focused on *applied* health research, ensuring our findings have an impact on health and care is integral to what we do. Our strategy to maximise impact has been to plan, support, and drive its delivery, in every theme and at every stage of research. To achieve this, a Schoollevel guidance framework ensures staff embed impact objectives into appraisals, and the School also funds impact activities. We use the services and structures created through the University Enterprise and Impact strategy, together with strong regional, national and international partnerships, to generate impact.

Led by **Foster**, impact is strategically planned and supported from the conception of research through to adoption and application of findings. Bi-monthly School impact meetings bring together **Foster**, research theme leads, Faculty impact support lead, School enterprise champion (**Metcalf**), and University impact lead to set strategy and allocate resources for future impact activities. Termly impact workshops and bi-monthly drop-in sessions encourage all staff to exchange strategies for impact and develop case studies.

We are supported by the University's Public Engagement with Research unit (PERu) and Public Policy Southampton (PP|S) (REF5a§2.9) which provide training and collaborate on grants to shape effective pathways to adoption and impact, including preparing policy briefs, submitting evidence to parliamentary committees, and contacting key policy makers.

1.5 Key Achievements since 2014

- FUNDING: Increased our research income nearly threefold during the last 7 years (from £12.5M to £34.5M) including three major infrastructure grants: NIHR Applied Research Collaboration (ARC); Macmillan Cancer Support; Centre of Excellence for Sport, Exercise and Osteoarthritis Research Versus Arthritis.
- PEOPLE: Increased the number of REF-eligible staff by 75% from 38 to 64 (77% women; 30% part-time); attracted and created a substantial pipeline of 29 independent post-doctoral researchers; successfully supported the moves of 15 staff to tenured researcheducation contracts; transitioned 75% of our fixed-term contract researchers to open-ended contracts; no gender pay gap. We have also extended and expanded capacity for Clinical Academic Careers (45 awards 2014-20).

- INFRASTUCTURE: Invested £3M in co-locating our Highfield Campus research staff into a single building with new facilities and social spaces, including a biomechanics/gait lab and PGR study suite.
- OUTPUTS: Published 2,363 papers since 2014; 44% in collaboration with international coauthors and >90% are interdisciplinary.

Achievements of each research theme are summarised:

THEME 1: Active Living

This theme comprises the Active Living for Health Group with research programmes that optimise neuro-musculoskeletal health across the life-course, to enable active living and healthy ageing. Awarded a further 5-year infrastructure fund 2018 for the *Centre of Excellence for Sport, Exercise and Osteoarthritis Research Versus Arthritis* (£5M; £450k Southampton), this interdisciplinary group hosts the International Movement Screening and Interventions Group (USA, Australia, Europe, Africa, Japan) led by **Stokes**. Their findings have led to changes in UK military policy, altering routine movement screening of recruits, and work continues to develop exercise programmes in elite and recreational sports to prevent injury and osteoarthritis.

Stokes also led the European Space Agency (ESA) Topical Team (2014-16), producing recommendations for rehabilitation of astronauts and others following long-term inactivity (Stokes et al 2017). Together with **Warner**, **Stokes** plays a key role in the £50M Myotones project led by ESA and supported by NASA and UK Space Agency (funding Southampton, £198k). Projects contributed to robust protocols for novel technologies that made real-time inflight monitoring of the health of astronauts' muscles possible for the first time in microgravity on the International Space Station. The work has had practical applications on Earth e.g. objective measurement of muscle tone in neurological patients; remote guidance of astronauts via videoconference provided lessons for virtual clinics with patients during the Covid-19 pandemic.

The Group's work on ultrasound imaging has influenced policy and practice in podiatry and physiotherapy worldwide (ICS03-04). Research from the foot and ankle research team (**Bowen**, **Cherry, Gates**) underpinned the introduction of Diagnostic Ultrasound Imaging (DUSI) to podiatry. Ultrasound imaging (USI) research in physiotherapy (**Stokes, Warner, Whittaker, Worsley**) has led to increased adoption of USI in the UK, and internationally in 50 countries.

Adams' programme of patient education and exercise for inflammatory and degenerative arthritis has tested splints in the OTTER II trial (£417k) and the SARAH trial. **Adams** received an international award from the Physiotherapy Evidence Database (PEDro), as one of the five best physiotherapy trials across the globe published 2014-19.

Burridge, Hughes and Turk's work on neurorehabilitation involves collaborations with UCL and the University of Maryland (USA), and focuses on upper limbs. An NIHR-i4i grant (£1.05M) funded the development of M-MARK (**Burridge, Turk, Stokes**), a wearable sensor system to provide a home-based rehabilitation programme. A web-based interactive system to support patients using Constraint Induced Therapy for upper limb recovery following stroke has been developed and is undergoing clinical trials in the USA. **Kunkel's** work builds on **Ashburn**'s home-based sensor technologies developed through the EPSRC funded SPHERE project (£11.7M) and falls prevention for people with Parkinson's Disease.

THEME 2: Health Needs

2a) Cancer and Life Limiting Conditions Research Group

Foster and **Darlington** co-lead this group, who have undertaken exploratory and definitive trials, large prospective cohort studies, qualitative research, and developed new approaches to analysing large datasets. The group hosts the Macmillan Survivorship Research Group (MSRG, led by **Foster**) which has grown significantly since 2016 (>£5M in programme funding). MSRG established UK-wide prospective cohorts (n=6,000 patients) (**Foster, Calman, Richardson**) to understand the impact of cancer on quality of life. Strong partnerships have been built with >100 UK hospitals, NHS Alliances, leading clinicians, academics and charities, particularly Macmillan Cancer Support (ICS03-03).

Quality of life outcomes for cancer patients have been measured in other large national (**Wagland**) and international studies including the European Organisation for Trials in Cancer (EORTC >£1M; n=40 international collaborating centres, **Darlington**) and Movember Global Registry (£500k, 14 countries, **Foster** UK co-lead).

Research that enables the identification of those most at risk of poorer outcomes has impacted on practice, by allowing support to be targeted to where it is most needed.

The group has created interventions to support self-management for cancer survivors (TrueNTH; **Richardson, Foster, Frankland**); people experiencing fatigue (MSRG-RESTORE; **Foster, Calman, Grimmett**); cancer survivors in primary care (NIHR Programme Grant £4M **Richardson, Foster**); and for children, through online games (Kidney-Care-UK & BRS £46k **Darlington**). Research has led to new models of care, including digital solutions (**Foster, Richardson**), highlighted as a good practice exemplar by NHS England and adopted internationally (ICS03-03).

New approaches created and tested by **Foster, Brindle, Darlington,** and **Wheelwright** support complex decision-making including patients' decisions regarding genetic testing (CRUK-Catalyst-Award of >£4M), earlier cancer diagnosis (CRUK £125k, **Brindle**), and choice of treatments (PCUK £285k, **Brindle**).

Brindle developed evidence-based e-learning to improve patient-clinician communication about possible cancer (ESRC impact £11k). Our research has examined support for decision-making at end of life (**Duke, Richardson**), and organ donation through a £720k NIHR-HSDR funded study (**Long-Sutehall**).

2b) Ageing and Dementia Research Group

Led by **Bridges**, in its first five years this group has developed into a vibrant interdisciplinary community and secured >£3.5M funding. Strong partnerships with NHS, social care and communities of older people shape the research; e.g. Associate Clinical Professor of Older People and Frailty (**Sadler**) is co-funded by NHS partner Southern Health NHSFT. A key achievement has been the establishment (by **Bartlett, Bowling, Bridges**) of a doctoral training centre in dementia care (>£700k, NIHR, Alzheimer's Society) with five graduations to date. Additionally, a unique dementia care bridging fellow scheme has supported postgraduates to transition to research careers. **Bridges** is Deputy Ageing and Dementia lead for NIHR ARC Wessex, the national lead ARC for ageing, dementia and frailty research (£1.88M national NIHR programme).

The "Creating Learning Environments for Compassionate Care" (CLECC) intervention developed and evaluated by the Group has supported compassionate care delivery by general hospital nursing teams caring for older people. With support from the Chief Nursing Officer team/NHS England, CLECC is being adapted and evaluated in mental health settings, with plans



for national adoption in NHS in-patient and care home settings. CLECC findings informed international evidence-based guidelines, co-authored by **Bridges**, targeted at preserving nurses' psychological wellbeing during Covid-19. **Bridges**' ARC research further supports CLECC scaleup and roll-out, and ECR-led applied research projects. Walsh was awarded £766k (NIHR) to investigate trends in the progression of frailty and the dynamics of frailty-related healthcare demand in the older population, to inform the design and delivery of future healthcare services.

2c) Long-Term Conditions Research Group

Led by **Portillo** since 2019, this Group builds on 10 years (>£6M) work in Europe and South America. The person-centred assessment tool "Living with Chronic Illness Scale" developed by the Group, has been tested and implemented in clinical practice with >4,000 people with longterm conditions. **Hislop** and **Serrano** are adapting it for use in the UK, to improve the referral process for people with different long-term conditions and multi-morbidity. **Portillo** and **Frankland** are working with commissioners, professionals, managers and front-line staff to enhance communication skills and programmes to underpin personalised care (>£300k Dorset and Portsmouth CCGs, Hampshire and IoW-STP).

Building from the ReNACE programme in Spain and FP7 EUWISE project across Europe, **Portillo** and **Kunkel** have built further collaborations between Denmark, Norway, Spain and UK to develop and test multiagency interventions and a care pathway to mobilise resources for people with Parkinson's Disease and carers (Optim Park project, Joint Programme for Neurodegenerative Disease, €975K EU; participating country funders).

THEME 3: Fundamental Care

3a) Medicines management Research Group

Collaborating with leading academics from medicine, pharmacy, psychology and health economics, as well as clinicians, **Latter** has led research that is influencing policy and practice on health professionals' roles in supporting medicines management, and optimising medicine-taking by patients. Major awards since 2014 have been secured from NIHR (£1.1M+), including grants to fund research on: developing and testing interventions for self-management of end-of-life medicines at home, and evaluating access to medicines at the end-of-life; improving antimicrobial stewardship in hospital settings (**Latter**, Merck-Sharpe-Dohme £323k); industry-funded studies on patient experience and outcomes of biosimilars for Irritable Bowel Disease (**Latter**, Biogen-Idec £1.3M). **Latter, Campling, Richardson** and **Ewings'** recent research on experiences of accessing end-of-life medicines from community pharmacies is informing NHS England (NHSE) service provision and community pharmacist provision nationally in Wales.

3b) Continence Management Research Group

Working with product users, microbiologists, engineers and designers to understand the limitations and problems of current products, **Fader** and team (**Macaulay, Murphy, Wilks, Prieto, Lwaleed**) have analysed the needs of users worldwide to develop new ways of managing incontinence, online resources and new products based on science. Key achievements include: development and testing of cleaning methods for urinary catheters (NIHR-PGfAR £2M), development of resources and products for men with incontinence after prostate cancer (Movember £800k) and development and testing of new catheter designs and devices (NIHR-RfPB £220k; NIHR-i4i £750k).

Industry funding in partnership with the National Biofilms Innovation Centre (Nanovibronix; JVS Products Ltd) is leading to development of methods and products to reduce catheter-associated urinary tract infection. Collaborations with organisations have led to development of resources



for people with dementia (Alzheimer's-Research-UK £240k), and product procurement specifications and training for those from low-income countries (World Health Organisation).

Based on our quadrennial review published in the International Consultation on Incontinence, since 2012 we have designed and implemented a continence product website which provides uniquely independent, evidence-based, comprehensive information to help product selection. This incorporates a validated continence 'Product Decision Aid' (PDA) demonstrated to improve user confidence in product selection. The website is listed on NHS.org and websites such as USA Continence Central, receiving more than a million visits (ICS03-02).

3c) Skin Health Research Group

Bader and **Worsley** have led research on the prevention of pressure ulcers, with funding from UK Research Councils, NIHR, charities and industrial collaborations (~£3M since 2014). A multidisciplinary approach involving healthcare professionals, engineers and biomedical scientists has supported the development of innovative technologies for skin health. Research has attracted international internships and research personnel (Netherlands, Israel, US, Sweden, Canada and Australia), growing substantively since the Group was established in 2010. **Schoonhoven and Worsley** have led international guidelines (NPUAP/EPAUP/PPPIA 2016 & 2019), supporting translation of research into clinical practice.

Bader and **Worsley** led the first EPSRC-NIHR funded International Network of Medical Devices and Vulnerable Skin (2014-19, £650k). Through NetworkPLUS, they funded 14 external projects, partnering with colleagues from >30 academic, industrial, and clinical disciplines. This has involved a range of applications including work to assess the impact of respiratory face-masks in intensive care units (a major consideration during the Covid-19 pandemic). **Bader and Worsley** also collaborated with engineers (**Jiang and Dickinson**) to monitor shape changes and loading conditions at the interface between the stump and socket of amputees (2016-20, £1.5M).

Other work has examined the performance of support surfaces on skin health, resulting in new mattress systems (>200,000 units sold internationally since 2014). **Bader** and **Worsley** have continued this research through a large multidisciplinary H2020-MSCA-ITN-2018 EU Innovation Training Network project "STINTS: Skin Tissue Integrity under Shear" (2019-23). This has enabled wider impact, with new international industrial partners including Phillips (Netherlands), Unilever (UK and Ireland) and Essity (Sweden), (ICS03-05).

THEME 4: Health Work

4a) Health Workforce and Systems Research Group

Bringing together techniques and skills from economics, epidemiology, and operational research, this Group addresses key questions about safe and efficient deployment of the health workforce. Led by **Griffiths** and **Ball**, the Group also provides leadership for the related theme in the NIHR ARC (Griffiths). Research has centred around two related strands:

 Firstly, understanding how the size and composition of the healthcare workforce influences quality of care, patient experience and outcomes. Griffiths' NIHR-HSDR (£491k) study was the first to use patient level longitudinal data to model the costs and consequences of variation in nurse staffing. It identified missed vital-signs observations as a key factor in the relationship between nurse staffing and patient mortality, established that substitution with support workers had adverse outcomes at increased cost. An extended replication now underway (Griffiths, Ball, Saville, Dall'Ora, Jones, NIHR-HSDR £713k) develops the economic models to better inform policy, considering multidisciplinary staff and a broader range of outcomes.



Secondly, identification and evaluation of factors and interventions which can support healthcare teams to deliver care safely and effectively, including shift systems, rostering, workload assessment, quality improvement programmes. Dall'Ora's work on 12-hour shifts has challenged assumptions about them being a cost-effective mode of work, revealing sickness absence increases and unintended consequences. Saville and Griffiths identified patterns of nursing workload variation and assessed the performance of the NICE endorsed 'Safer Nursing Care Tool'. Results showed that planning to meet average demand results in frequent critical understaffing (NIHR-HSDR £513k). Research in the ARC has created opportunity for ECRs (Dall'Ora, Saville) to further develop their work in this area as independent researchers.

In collaboration with KCL, **Griffiths** evaluated the long-term impacts of *Productive Ward* - a quality improvement programme that was implemented across the NHS (NIHR £308k). In collaboration with colleagues at the Centre for Health Informatics (at UoPortsmouth) **Jones** & **Griffiths** are working to establish the workload, costs and consequences of different approaches to scheduling nursing vital signs observations using the National Early Warning Score, to identify optimal monitoring regimes from routine data (NIHR-HSDR £867k).

Successful collaboration in Europe resulted in becoming the lead for England of the 6-country Magnet4Europe study, a cluster randomised controlled trial implementing principles of the Magnet® programme to improve staff wellbeing in hospitals (**Ball, Bridges, Griffiths**, Horizon-2020 €4M/€487k-UoS). Research findings have influenced national policy on safe staffing in the UK (NHS-Improvement, NICE, Wales legislation review) and internationally (ICS03-01). **Ball,** in partnership with Bangor, led a PRP-funded study to examine the implementation of safe staffing policies in England (£484k).

Evidence Briefs disseminated through the ARC and published online and by *Nursing Times* ensure findings are disseminated beyond academia to healthcare professionals.

4b) Social Networks, Health and Well-being Research Group

Self-directed support for self-management for long-term conditions is part of NHS England's personalised care strategy, which aims to give people more control over how their care is planned and delivered, and enable 'joined-up' provision.

Vassilev & Rogers' work has explored the nature of social networks and work undertaken outside formal health services in community and domestic settings, and developed methods and tools for assessing network structure (network typologies), network capacity for support (network work, collective efficacy), and network change. They have developed and implemented a social network, web-based, tool, "Genie", which reduces the utilisation of traditional services (making it cost-effective) whilst improving outcomes and being valued by users. It has been promoted by NHSE's personalised care division as an exemplar of good practice. Genie has been adopted for use by Southampton City Council, and has been used in research studies across the UK, Canada, and Australia. Work on social networks continues with the Project About Loneliness and Social networks (PALS) study (NIHR Public Health Research Programme, 2018-21, £976k).

5) Collaborations for Leadership in Applied Health Research and Care (CLAHRC) and Applied Research Centre (ARC)

The CLAHRC and ARC embody our strength in collaboration for applied research. Hosted jointly with the Faculty of Medicine, NIHR CLAHRC Wessex (2014-19) was led by Director **Rogers**, with theme leads **Griffiths/Fader, Richardson, Rogers, Vassilev**. It represented a five-year collaboration, created a portfolio of 91 studies, with 3,874 participants, generated new



knowledge disseminated through 206 publications, and seeded the next generation of researchers by supporting 22 healthcare professionals.

The NIHR ARC Wessex (2019-24) brings together the Hampshire & Isle of Wight and Dorset Integrated Care Systems which represents all Wessex Trusts, Southampton and Portsmouth City Councils and four university partners (Southampton, Winchester, Portsmouth and Dorset) (§4). School staff **Bridges, Griffiths, Portillo,** and **Stokes** play leading roles in the ARC, which is led by Director **Richardson**.

1.6 Our core values

a) Valuing people (§2).

Equality, Diversity and Inclusion (EDI): With the support of our EDI group (chaired by **Stokes**) we provide an environment that allows talent from a diverse range of perspectives and backgrounds, and people with varied personal contexts, to thrive equally in their research careers.

Interdisciplinarity: our staff, students and collaborators reflect a wide range of perspectives and paradigms. We draw on different disciplines, professions, communities, and methodologies to deliver research. In addition to our core disciplines of nursing, physiotherapy, podiatry and occupational therapy, our community includes economists, engineers, biological scientists, operational researchers, psychologists, pharmacists, statisticians and social scientists.

b) Engagement and Involvement

We are committed to working with members of the public and patients as active collaborators and partners across our work programmes. All three of our infrastructure grants have mature PPI/E groups to support the design, development, dissemination, and implementation of research for maximum impact. Active collaboration extends to regularly including lay collaborators as co-investigators on grants to help co-create research that is meaningful and important for the public and patients (§4).

c) Open Research

The University is recognised as a leader in open research (REF5a§2.4). Health Sciences actively supports researchers to ensure all outputs are made open access (OA), with dedicated administrative support provided for green archiving in the University's ePrints repository. From a high baseline, most of our research outputs are open access, rising from 73% (pre-2017) to >90% (2019/20). With dedicated Library support, we monitor use of open access and provide supportive feedback to all staff.

The School's Open Science Champion (**Griffiths**, an editor with Elsevier) has been instrumental in changing policies towards open access and has published guidance. He contributed to a University review of the sustainability of gold OA which informed the decision to negotiate 'no-additional-cost' deals with journal publishers. The Faculty has progressively provided financial support where the Library could not solely fund a deal (e.g. PLOS). This benefits all researchers, particularly ECRs and PhD students.

We hold seminars for PhD students, ECRs and more experienced staff addressing the latest developments in open science and have mandatory data management training, which includes issues of archiving and open data. Research Groups make use of ePrints to archive and make pseudonymous data publicly available for use by other researchers (e.g.

<u>https://eprints.soton.ac.uk/435408/</u>). Following University policy on responsible metrics, all appraisers are fully briefed to avoid the misuse of journal impact factors and other metrics when judging performance and setting objectives.

d) Research Integrity

The highest standards of research integrity are ensured by the implementation of robust policies based on the *Concordat to Support Research Integrity (REF5a*§2.8). Research leads enact this through mentoring and appraisal processes which focus on excellence, transparency, accountability and responsiveness. Health Sciences has a research ethics sub-committee, overseen by the Faculty Ethics Committee (which includes a lay member; **Warner** is Vice-Chair) supported by a central research integrity and governance team of six staff. Their work is administered through an on-line ethics approval system (REF5a§2.8) which serves as a portal for all applications.

e) Collaboration and Partnerships

Over 90% of our grant income and publications are interdisciplinary collaborations (§4). We collaborate with University Strategic Interdisciplinary Research Institutes (REF5a§2.6): *Institute for Life Sciences, Web Science Institute, Southampton Statistical Sciences Research Institute* and *Southampton Marine & Maritime Institute*. Beyond the School we jointly lead, contribute to, and supervise research across Schools and Faculties, and collaborate with academic and industry partners globally (§4).

1.7 Future strategy

Building on the success across the four research themes, our future strategy focusses on realising staff potential to enable progression and succession planning. In 2014-2020 we transformed our staff profile (Fig.2), to invigorate and grow our talent pipeline. We will continue to proactively support research staff to further develop their expertise, enabling progression to leadership of research programmes.

Over the next five years we will build on our strengths and interdisciplinarity to create two new world-leading cross-University research centres with the *Institute for Life Sciences*, to meet pressing societal challenges in these areas:

- Mental Health (in partnership with the School of Psychology), and
- Child and Adolescent Health (in partnership with the Faculty of Medicine; led by recent appointment of **Barker**).

University investment in infrastructure – at University Hospital Southampton (UHS) and the joint Medicine and Health Sciences building at Highfield – will create new facilities that enable strengthening of clinical focused work in partnership with Medicine.

2. People

2.1 Staffing strategy and staff development

Our staffing strategy has been to grow and develop our interdisciplinary research-active staff to produce world-leading research and transform healthcare. It is underpinned by our core values (§1.6), EDI (§2.4) with staff development at its heart.

In this REF period we have focused on attracting, developing, supporting, retaining and promoting talented early career researchers and promoting able candidates to senior posts. Our objective has been to take advantage of natural turnover to reinvest in building new critical mass, creating a platform and pipeline of able junior researchers to ensure succession planning and the sustainability of our research themes. We have achieved this by generating a lively, enquiring, impact-focused learning culture to nurture and develop our existing staff, combined with making a small number of key external mid-career staff appointments.

A central part of our people strategy has been to develop our own skilled researchers and to move them to permanent academic posts either through internal promotions/pathway or equitably and transparently advertised internal appointments. This also provides a platform and pipeline of expertise into our research themes.

Through active development and support we have created a new generation of research leaders of exceptional talent and promise. Since 2013/14 we have supported 9 promotions to Chair (8F:1M) (Adams, Ball, Bowen, Bridges, Darlington, Foster, Lwaleed, Portillo, Roberts) and Calman and Worsley to Associate Professor (1F:1M); 84% of our professors are women.

We have actively mentored and supported a total of **15** post-doctoral staff (9F:6M) to tenured appointments (**Brooks, Calman, Campling, Cherry, Dall'ora, Ewings, Hope, Hunt, Kunkel, Turk, Wagland, Warner, Wilks, Worsley** and **Vassilev** including 1F (**Turk**) from education and 1M (**Warner**) from technician pathways.

2.1.2 New appointments and cross-disciplinary joint-appointments.

Four strategic appointments have been made at Associate Professor level (2F:2M) for **Portillo**, **Ball** (both since promoted to Professor) and **Sadler**, all recruited from KCL, and **Vassilev** from Manchester. **Portillo's** expertise in long-term conditions (specifically Parkinson's Disease) strengthens leadership of our Long-term Conditions Group within Health Needs while **Ball** brings international workforce and safe staffing expertise to Health Workforce and Systems. **Sadler** brings unique frailty and implementation science clinical academic expertise (§2.1.3) to the Ageing and Dementia Group and is a joint-appointment with Southern NHS Trust, and **Vassilev** brings national and international expertise in social network research.

We have made two strategic joint-appointments with other Faculties/Schools. **Wilks** joined us as a microbiologist (2014) with the School of Biological Sciences bringing expertise in biofilms from the National Biofilms Centre. As a member of the Fundamental Care Bladder and Bowel Management Group, she has built on their work in urinary catheters and devices. Psychologist **Barker** is a joint appointment (2020) with the Faculty of Medicine as Professor of Adolescent Behaviour. She will be leading the new Child and Adolescent Health Research Group (§1.7).

2.1.3 Clinical Academics

The School has long and pioneering history of developing clinical academics. **Roberts** leads the Clinical Academic strategy group which supports the development of new posts and plans, and delivers our co-funded doctoral fellowship scheme with 6 Trusts and other clinical partners (§2.4). Our clinical academics have a purpose-built Clinical Academic Facility (£1.3M investment in REF2014 period) at University Hospital Southampton (UHS) for their co-location. Most of our clinical academics have completed NIHR clinical academic fellowships and all have joint appointments with a Trust partner: **Richardson** (UHS), **Roberts** (NIHR Senior Clinical Lectureship; UHS), **Prieto** (NIHR Senior Clinical Lectureship; UHS), **Sadler** (Southern Health), **Cherry** (NIHR Clinical Lectureship; Solent).

Fifty-one NIHR, ARC and School/Trust partnership funded clinical academic PGR students have been awarded during this REF period (§2.4)

2.1.4 Investment in co-location

To further support our strategy of fostering collaboration and interdisciplinarity we consolidated on one main site at Highfield (§3). This has enabled staff from two distant buildings to be colocated to foster strong communities of researchers within their themes and promoting intertheme synergies.



The success of our overall strategy is shown in the growth and constitution of our REF-eligible staff with a transformation in the profile of our staffing structure. In REF2014 we returned 38 staff (30F:8M) compared to 64 staff (49F:15M) in REF2021. The proportion of women has remained constant at ~78% but staff enabled to work part-time have increased from 8 (21%) to 20 (31%). Changes in staff levels are shown in Fig. 2.

Fig.2: Staff Growth



L7 Professors and Professorial Fellows (Research); L6 Associate Professors and Principal Research Fellows; L5 Lecturers and Senior Research Fellows; L4 Research Fellows (light blue).

2.1.5 Appraisal and mentorship

Supportive and developmental appraisal has been the cornerstone of our staffing strategy. As part of our Athena SWAN action plan, following REF2014 we have developed a consistent set of objectives for use in appraisals. These objectives include income, outputs and impact, and include the planning process for supporting staff development needs and providing career development reviews, tailored for special circumstances. A key responsibility of the appraisal process is to nurture staff to their next promotion or pathway move and identify support and development needs which require study leave, financial support or development opportunities (§2.1.6) so that resources can be equitably distributed. All line managers have received University line management, appraisal and ED&I training, and ED&I and appraisal completion is monitored (100% excluding those on extended leave).

Mentors are vital for career progression and the Faculty has a mentorship development programme to grow, train and support mentors. Health Sciences alone has more than 30 trained mentors and all staff have a mentor (usually an experienced professor) identified as part of their induction process. The mentorship programme comprises experienced staff with a range of characteristics and expertise (including impact development) from across the Faculty. This enables staff and ECRs (§2.3) to find suitable mentors from a wide range of disciplines to support their needs at different stages during their career. To further support promotion, the Faculty organises several workshops annually which are open to all staff and include the opportunity to 'buddy' with staff who have recently been promoted.

Following appraisal, achievement of research and impact objectives is rewarded annually using the University Reward and Recognition framework and there are three advertised opportunities every year for further reward (through achievement awards and additional increments) with applications reviewed and moderated at Faculty panels.

2.1.6 Career development, support, and wellbeing

Health Sciences ensures staff have the time and resources they need to flourish and protect their wellbeing, and we pay particular attention to issues of equity and circumstances when allocating resources:

i) Workload Management. Our Athena Swan action plan highlighted the need for an equitable and transparent workload model to protect research time and ensure staff wellbeing. Our model has been developed following a year of consultation with staff (2017/18) and examination of national workload models, and takes account of part-time



working, joint appointments, administrative, management and leaderships roles. The model ensures that all balanced (research and education) pathway staff have, in every year, a substantial minimum amount of protected time (\geq 40%) to undertake research. This baseline can be adjusted upwards, by reducing teaching and administrative responsibilities, for staff with special circumstances (*e.g.*, following periods of illness or parental leave). Workload levels and allocation processes are transparent, allowing gender benchmarking and fairness in the allocation of work. For the most recent academic year (2018/19 pre-Covid) female staff spent on average 41% of their time on research compared to 40% for male staff.

ii) Financial Support and study leave is openly available through an annual budget and application process to all staff including post-doctoral research assistants. A departmental level panel monitors and collates staff and career development information from line managers and reviews requests for financial support and study leave with around £210k spent during this REF period. Staff with external grants also retain a proportion of overheads which, together with consultancy funds, can be carried over from year to year. These mechanisms support activities such as conference attendance and other CPD. Staff with Directly Allocated hours on external grants that exceed the baseline research allocation are eligible for an equivalent reduction in teaching/administrative duties.

iii) **Support for career development** is provided by the University's Centre for Higher Education Practice (CHEP, REF5a§3.5). Dedicated training supported by key on-line resources is offered in both specialist and transferable skills aligned to the Researcher Development Framework, including leadership and management training. All staff on research pathways are offered an education development mentor and supported to gain experience and skills in education to meet the attributes required for a pathway move (§2.1.1). Development of impact skills is supported by a Faculty impact team who hold regular impact development workshops open to all staff.

iv) Support for research fellowships is designed to maximise the success of staff including ECRs and post-graduate research students (§2.4). Fellowships Champion (**Bowen** previously **Bruton**) and Clinical Academic Champion (**Roberts**) together with a Fellowship Strategy group provide support for applications. A systematic and transparent internal process ensures equitable access to organisational support before, during and after fellowships. Supported by Research and Innovation Services (RIS, REF5a§1.5), this process is seen as a model in talent management which is being replicated across the University. There have been 23 applications with 15 awards from 7 funders (2014-20) including a Turing Fellowship (**Monks**) and Alzheimer's Society junior fellowship (**Murphy**). **Bruton** was the first physiotherapist to be awarded an NIHR Senior Research Fellowship and **Bowen** the first podiatrist in the UK to have been awarded an NIHR Career Development Fellowship.

In partnership with UHS (2016) we established the Southampton Academy of Research offering a career development programme from pre-doctoral level to joint clinical academic post-doctoral appointments. 152 UHS/UoS staff have participated and 4 fellowships have been awarded.

2.2 Equality, Diversity and Inclusion

The University's Equality Plan (REF5a§3.8) provides operational frameworks and training to ensure active engagement with equalities legislation and University processes. The University of Southampton was a founding signatory of the Athena SWAN Charter in 2005, achieving Silver in 2016. The School of Health Sciences achieved Athena Swan Bronze status in 2018 and is working towards achieving Silver by 2022. Our gender pay gap has improved during the REF period and is now less than 1%, favouring women.



Professor **Stokes** chairs the School ED&I group of 19 staff and 6 students with several protected characteristics being represented. A monthly working group plans strategy and is delivering an ambitious action plan. The group reports to Faculty ED&I, Athena SWAN self-assessment team, and to the School Board. **Stokes** is also a member of the University ED&I Committee.

Infrastructures and programmes to support women researchers are well-developed and have good up-take from staff; they include Athena SWAN events, Women in Science Engineering and Technology Group (chaired by **Walker**), Faculty ED&I Network and a University-wide Springboard programme for women led by **Pope** (49 attendees leading to 10 successful promotions).

Pregnancy, maternity and family support: Our family-friendly culture supports parental leave (16 maternity; 6 paternity; 3 adoption leave during REF period); 81% were still in the School 12 months after their return. Staff on parental leave are offered up to 10 'keeping in touch days' (100% take up) and maintain access to the intranet to stay informed with Faculty news. A private rest room for breast-feeding is available for staff and students. Staff have regular meetings with their line-manager to ease the transition back to work and discussions include their return-to-work plan, career aspirations, workload and flexible working options. In 2019 we implemented a Family and Caring Leave Support Policy to ensure support for ERE staff throughout periods of extended leave and to minimise the impact on academic activities. An annual budget is set aside to support staff who require bridging between grants to further support return from maternity leave. This is available to all staff and has been requested and awarded twice.

Part-time, flexible hours and remote working: We recognise that staff have a range of needs such as family commitments or caring responsibilities and support this by facilitating part-time and flexible working. The proportion of staff who work part-time has increased by 50% since the previous REF period (now 31%). The freedom to work flexibly is supported both formally and informally and all line-managers have training in managing flexible working patterns. More than150 formal applications to changes in working hours have been made since 2014 and all were approved.

2.3 Early career researchers

The University implemented the *Concordat to Support the Career Development of Researchers* in 2009 and achieved the HR Excellence in Research (HR-EiR) award in 2012, becoming a signatory to the revised Concordat in 2020. **Fader** led the University Concordat Steering Group from 2015-18 including the renewal of the HR-EiR award in 2016, which was subsequently renewed in 2020. The three principles of the revised Concordat (2019) are currently being enacted within the School:

i) A supportive and inclusive research culture is championed by the Deputy Head of School Research and Enterprise and the Faculty Concordat Champion together with our Early Career Research Concordat representative (ECR Gates) who is a member of the School Research and Enterprise Executive Group. An ECR team represents ECRs on School committees and activities (Allen: Engagement group; Fogg: Clinical Academic Strategy; Dall'Ora: Fellowship committee). A designated ECR resource and meeting room supports ECR communications on policies (including research integrity), events and practices together with a bespoke SharePoint site. An annual survey of ECRs informs development needs and training which are co-developed and organised within the School in addition to dedicated training in both specialist and transferable skills (including writing workshops, grant gaining, career development events) aligned to the Vitae Researcher Development Framework, along with key on-line resources managed by CHEP, for example Working as a Researcher website, ECR Development Hub, and Gateway to Teaching. The annual Health Sciences and



Faculty of Medicine Research Conference brings together ECRs and post-graduate researchers from different disciplines.

ii) Researchers are recruited, employed and managed under conditions that recognise and value their contributions. The School introduced the open, transparent and meritbased recruitment (OTM-R) checklist in 2016, to support University policies to ensure fair and inclusive selection and appointment. Policies are regularly reviewed via the HR and Athena SWAN processes; they include a transparent process of short-listing and interviewing, gender-mixed and unconscious bias training. The School staff induction programme is designed to enable new researchers to be integrated into the School research community, and familiar with policies and practices.

Security of employment for fixed-term contract staff has been addressed using three methods:

- monitoring new awards and proactively internally advertising posts to fixed-term staff to enable redeployment through successive contract extensions;
- offering all academic and professional staff on successive fixed-term contracts extending beyond four years the opportunity to change to an open-ended contract. 75% of eligible staff have chosen to convert to open-ended contracts;
- creating capacity for pathway moves and internal appointments to balanced (research and education) pathway posts (§2.1.6) combined with meticulous attention to staff development so ECRs have the skills necessary to secure such posts.

iii) **Professional and career development** is offered to all ECRs (§2.1.6). 200hrs of professional development time is protected (pro-rata) for career development and training activities. ECRs have access to Careers Services resources, drop-in and one-to-one advice sessions. Annual review of career development takes place at appraisal and all staff have at least one mentor (§2.1.5).

2.4 Post-graduate Researchers (PGR)

We have a large and vibrant postgraduate research community of 111 PhD students. Led by Doctoral Programme Director (DPD), **Walsh**, doctoral programmes are managed via the Health Sciences PGR Programmes Operational Group, which includes a Senior Academic Tutor for PGR programmes (**Myall**; also Athena Swan lead), and two PGR student representatives. Both **Walsh** and **Myall** are members of the School ED&I Group and have Mental Health First Aid training.

Since REF2014 there have been 134 completions.

2.4.1 Recruitment and Financial Support

The Faculty and Health Sciences recruitment policy is consistent with recognised good practice for inclusive recruitment. PGR fellowships are advertised externally, and students are recruited through open competition adhering to University policies for equity and transparency. For externally-funded personal awards, students and supervisors work together on developing a proposal and funding (§2.1.6). All staff on interview panels are required to have undertaken unconscious bias and ED&I training. Applicants are assessed by two trained academics and undertake an interview with an independent Chair. The criteria for recruitment are competency focused, shortlisting is via ranking against pre-specified criteria, the decision to invite for interview lies outside the supervision team to reduce bias, and interviewees are asked about any specific accommodations for the interview. Funding of PGRs is derived from four main sources:

1. <u>Clinical academic fellowships</u>: Funded by the NIHR, NIHR-ARC and the Health Sciences Clinical Academic Programme, these run in partnership with local NHS Trusts. The Health



Sciences programme (launched in 2012) has enabled talented UG students to transition straight into a PhD which combines research and clinical practice over a 4.5 year period. We have developed a pipeline of clinical researchers and have partnerships with 6 Trusts who have invested £800k in the programme. 45 clinical academic fellowships have been awarded. Nineteen have graduated and 5 have since been employed by the School as ECRs.

- <u>Doctoral Training Programmes (DTP)</u>: Bartlett and Bowling (2015) were awarded funding for a Doctoral Training College by Alzheimer's UK (>£700k, six fellowships including two clinical academics). We also participate in the ESRC DTP (Brindle and Vassilev), two fellowships; and the Web Science DTP, two fellowships.
- International fellowships: We currently have 25 overseas fellowships (23 of whom are fulltime, 15F:10M) supported largely by government agencies. They comprise 23% of our current Year 1-4 students and provide a significant component of the international culture of the School. We have three Marie Curie Fellowships through the EU STINTS project (£500k).
- 4. <u>Institutional Schemes:</u> Competitive awards are allocated via the University's Strategic Research Groups and Interdisciplinary Institutes (REF5a§2.6). We currently host 4 (4F) students who have won scholarships from the University of Southampton Vice Chancellor's Studentships and two from the Institute of Life Sciences.

Other external funders include industry-funded fellowships e.g. MediRest (£90k) and SuMed £33k) jointly with EPSRC (£68k).

2.4.2 Training and Support

Preparation for doctoral training and fellowship applications has been delivered through the Health Sciences MRes (supported by NIHR studentship funding until 2018, offering 15 fully funded places per annum with 72 (56F:16M) successful completions since 2013/14). Since 2019 the NIHR has replaced this programme with the Pre-doctoral clinical academic (PCAF) scheme; **Roberts** is a panel member. The School has supported four (3F:1M) successful completions since 2018/19.

Our MRes programme (led by **Turnbull)** forms a key component of doctoral training, with students having access to all modules including design and methods and conducting research in clinical settings.

All PGRs follow a School Induction Programme and a Doctoral College PGR Handbook sets out policies, procedures and training requirements. Doctoral students undertake a training-needs analysis within the first three months, which is reviewed annually and at each progression review. All PGRs take general skills/research training courses, including the development of impact and Open Research, ethics, ED&I and Health and Safety, all of which are mapped to the UKRI sponsored *Vitae Researcher Development Framework*.

The University Doctoral College (REF5a§3.7) coordinates generic skills training via the GradBook online booking system and runs an annual Festival of Research event, facilitating inter-disciplinary engagement. PGRs are expected to attend the School's seminar programme, enabling interaction with external speakers. PGRs gain presentation skills by participating at the annual research conference (§2.3.i), at which prizes are awarded. Research students are also encouraged to attend external conferences and publish their work. A training grant of up to £1000pa per student is available.

Students are linked to a research group, embedding them within a research-intensive culture and fostering peer support. Regular PGR forums led by the DPD enable regular feedback and



engagement. Students can also raise issues through a termly Staff Student Liaison Committee (currently 3F:1M representatives). PGRs also have representatives on the main Faculty boards related to the Graduate School, teaching and research. International students are supported by a Faculty student representative and School student representatives.

2.4.3 Supervision and Progression

PGRs have a primary supervisor leading a supervisory team approved by the Graduate School. Junior staff are encouraged to co-supervise with more senior staff; all staff new to Health Sciences receive supervisor training. A senior tutor supports pastoral care in collaboration with the DPD.

Progress is reviewed by an independent assessor and a member of the supervisory team to decide progression to the second year. At the end of Year-2, full-time students undertake a 'Confirmation' examination to progress to Year-3. This consists of a 30-minute presentation to an open audience and their examiners, followed by a *viva voce* examination conducted by two internal assessors. In Year-3, students undertake a final progression review with their supervision team before progressing to submission. The 'PGR Tracker' system provides an online record of training courses attended, supervisory meetings, reports, progress reviews and outcomes.

3. Income, infrastructure and facilities

3.1 Funding

Health Sciences has had an accelerating income-base spanning 20 years, with research income having increased nearly threefold since REF2014 (Fig.3.1).





We have achieved sustained growth in research activity through a strategy of interdisciplinary collaborations and partnerships. This allows us to deliver high-impact research, which drives up our profile and reputation, reinforcing our relationship with the NHS, healthcare, industry and practice. We have a mixed research economy with ~25% of income coming from health charities (e.g. Macmillan; Versus Arthritis) and the remainder mainly from NIHR, Research Councils and other UK government funding agencies (Fig.3.2).

Fig.3.2 Research income by source (2013/14 – 2019/20)

Ninety percent of research applications and awards have interdisciplinary teams, exemplified by our outputs (§4). Funding achievements associated with each Theme are outlined in §1.5.

Three infrastructure grants have been pivotal to delivering research against strategic goals:

i) CLAHRC/ARC: NIHR CLAHRC Wessex received £10.8M grant plus an additional £12.9M was leveraged in matched funding to undertake practice-changing research. It enabled growth in expertise which has been carried into the ARC (2019-2024, £10.9M grant plus £3.3M matched funding), (§4).

ii) Macmillan Survivorship Research Group received >£5M funding during this period.

iii) Versus Arthritis awarded a further 5-years' infrastructure funding in 2018 for the *Centre of Excellence for Sport, Exercise and Osteoarthritis Research Versus Arthritis* (£5M; £450k Southampton).

3.2 Infrastructure and Facilities

We continued to invest in infrastructure, both at our main University site (Highfield) and at University Hospital Southampton (UHS). The £3M Investment in Building 67 on Highfield Campus in 2018/19 created new office spaces for co-location bringing research staff previously distributed across multiple locations into one building with a lift to all floors. The new consolidated environment has been designed for inclusivity and developed for the needs of each research theme, ensuring the availability of facilities equally to all staff. As well as modern workstations, 9 meeting rooms, and 4 redesigned staff/student kitchens and eating areas, each open plan area has two 'pods' that enable interaction without disturbing others, and two 'quiet rooms'. Staff individual needs are supported by providing specialist equipment including 13 sitto-stand desks, dual monitors for all staff to support electronic marking, basic desk chairs replaced with 250 ergonomic chairs, 5 dedicated dyslexia software installations and 100 installations of computer work-break software timers to ensure adequate rest breaks (2013/14-present).



This investment included a new PGR 'hub' offering individual workstations, open plan space, administrative and printing facilities to create a supportive and collaborative community. Students also have access to nearby study space in the new Centenary Building and social and sports facilities across the campus. Students can access support and guidance on health, well-being and finance from the SUSU Advice Centre and the University Enabling Services. PGR students undertaking a clinical academic fellowship are based at our purpose-built Clinical Academic Facility at UHS.

- <u>ARC facilities</u>: We have invested >£60k in the new ARC by leasing and refurbishing a dedicated facility at Chilworth Science Park adjacent to the Academic Health Sciences Network (AHSN) and the Centre for Implementation Science (CIS) to support further collaboration.
- <u>Macmillan Survivorship facilities</u>: A new office suite for the 24 staff of this Group has been created, locating them next to staff in Groups within the same research theme i.e. Ageing and Dementia and Long-term Conditions.
- <u>Versus Arthritis facilities</u>: A new biomechanical (movement) laboratory for the Active Living theme comprises state-of-the-art 3D motion capture systems, synchronised with electromyography (EMG) to investigate mechanisms of movement and evaluate interventions, such as exercise programmes. Portable technologies include: ultrasound imaging devices to support our podiatry and physiotherapy research (see ICS03-04); Myoton technology to assess mechanical properties of muscle (used to study muscle tone in astronauts and neurological patients); strength and balance testing equipment.

3.2.1 School and Shared Facilities

In addition to our dedicated facilities, our close relationship with the Faculty of Medicine and neighbouring trusts gives us to access to a range of additional facilities (Fig.3.3).



Fig.3.3 University and Regional Facilities and Partnerships



These facilities include:

- Excellent laboratory and equipment facilities to support our research into computerised lung sound analysis (electronic stethoscopes), breathing pattern analysis respiratory inductive plethysmography and respiratory therapy.
- Our own general purpose category 2 wet laboratory, offering facilities ranging from analysis of biomarkers in blood, tissue and body fluid samples, to full cell and tissue culture (cell incubators, laminar flow cabinets).
- The molecular and microbiology laboratories (managed by Medicine).
- A biomechanical skin laboratory and an environmentally controlled laboratory for the study of skin function, co-funded (£240k) by our Skin Health Group with the NIHR Biomedical Research Unit (BRU). Equipment enables the study of microvascular function, skin barrier function and wound healing.
- Respiratory BRU's world-class facilities for respiratory diagnostics and imaging.
- The NIHR Southampton Clinical Research Facility, a clinical environment dedicated to research, licensed for Phase 1 and Phase 2 trials. Users include **Fader**, **Wilks** and **Murphy**.
- Southampton Clinical Trials Unit (Adams, Murphy, Ashburn, Richardson).

3.2.2 University facilities

As part of the Institute for Life Sciences and the Faculty of Environmental and Life Sciences we access the following facilities:

- Microbiology laboratories in Biological Sciences including the National Biofilms Innovation Centre (**Wilks, Lwaleed**).
- Engineering facilities for 3D modelling and printing (**Donovan-Hall, Bader, Worsley, Macaulay, Fader**).
- Secure data facility and supercomputing (Griffiths, Jones, Saville).

3.2.3 Future developments

A £50M investment in the next five years from the University is enabling major regeneration of the health and medical research facilities at UHS, creating joint facilities for collaborative research.

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

4.1 Collaborations

4.1.1 Global collaborations

All research groups collaborate extensively with research and other institutions across the world. In total, 44% of our outputs were co-authored with international collaborators (SciVal 2020). Over the REF period, our co-authors came from 67 countries, 1015 academic institutions and 699 non-academic organisations internationally, including hospitals, governments and companies, reflecting our partnership with end-users of research. Our co-authors are based at 57 of the top 100 universities in the 2020 *QS World University Rankings* (Fig.4.1).

From 2014, the School has hosted international visitors from a range of disciplines, including from universities: Auckland University of Technology (Podiatry); British Columbia (Physiotherapy); Crete (General Practice); Karolinska Institute (Nursing); Macquarie, Australia





Fig.4.1 Global collaborations (outputs co-authorship, Source: Pure, 2020)

Our staff hold Professorial visiting research positions at universities worldwide: for example, Queensland University of Technology, Australia (**Bowen**); Chinese University of Hong Kong (**Griffiths**); Karolinska Institute, Sweden (**Griffiths**); University of Pennsylvania, USA (**Griffiths**); Deakin University, Australia (**Latter**); Temple University, USA (**Long-Sutehall**); University of Valencia, Spain (**Portillo**); University of Manchester (**Rogers**); University of Sydney, Australia (**Rogers**); University of Western Australia (**Rogers**).

4.1.2 Partnerships with health and care providers

Key to the delivery and implementation of transformative healthcare research is our partnership with the 11 NHS Trusts in the Wessex region (Fig.3.3). Our staff lead research on NHS-identified priorities in partnership with health and social care providers as a central part of Wessex CLARHC (2014-19) and ARC (2019-24) (§1.2, Fig.3.3). Our strong collaboration is reflected in joint-funded senior appointments as well as Trust-funded clinical academic doctoral fellowships (§2.1.3). **Fader** and **Richardson** are members of the Joint University Hospital Southampton Trust Research Strategy Board. Collaborations beyond local NHS providers include: charities (e.g. The Brendoncare Foundation, **Bridges**); NHS Blood and Transplant services (**Long-Sutehall**) Southampton and Portsmouth City Councils (**Vassilev**, **Rogers**) and Wessex hospices (**Calman, Campling, Darlington, Long-Sutehall, Myall, Wagland, Wheelwright**).

We are also strongly connected to the Wessex Academic Health Sciences Network (AHSN) (Fig.3.3) (**Fader** and **Richardson** are Board members) with collaborations including for example on implementing compassionate care for older people (**Bridges**), and medicines optimisation (**Latter**). In collaboration with the AHSN we host the Centre for Implementation Science (CIS), which undertakes evaluations of service and research improvements within the NHS. The CIS Director is a member of the Health Sciences Research Executive Group, and Health Sciences' staff liaise with AHSN and CIS on research, as well as regional dissemination and impact activities.



4.1.3 Partnerships with the public and patients

At a national level, we collaborate with a range of patient-focused charities and third sector organisations, for example, Macmillan Cancer Support (**Foster**), Prostate Cancer UK and Movember (**Foster, Richardson**) to enable our research to inform charity and third sector strategic direction as well as evidence-based care and support.

Local collaborations include School staff working closely with patients and the public on research via Wessex Public Involvement Network and Wessex Involvement in Service Delivery and Research (WISeRD) PPI advisory group, established by CLARHC and now advising ARC on PPI in research: **Rogers** was joint chair (2014-19) with ARC theme PPI links **Hope** and **Myall** as members. We work with the PPI lead, NHS Research Design Service (RDS) South Central for advice on PPI research design and recruitment of PPI study representatives.

School staff actively engage with local patient groups (e.g. **Cherry**, Gosport Partners Through Pain; **Hislop-Lennie**, British Lung Foundation Breathe Easy support groups).

To inform our research priorities and maximise our impact, all research groups actively work with patients and the public in all stages of research, from design to dissemination and impact. For example, MSRG led a UK research-prioritisation study involving people affected by cancer, co-created and delivered with patients and the public. This resulted in Macmillan's 4-year User-Led grant scheme and informed international models of partnership-working with patients and the public (**Foster**).

4.2 Contributions to the research base

We contribute significantly to global research outputs. In the REF period, we have published an average of 338 outputs annually. Our outputs' Field Weighted Citation Impact (2014-19) was 2.52 (i.e. 152% more cited than the expected level in our field, SciVal 2020). Our interdisciplinary reach is reflected in the range of journals in which we publish (Fig.4.2) with 92% of our returned outputs (REF2) being interdisciplinary.



Fig.4.2: Publications in different disciplinary Journals (SciVal 2020)

4.2.1 Research funding bodies

School staff contribute to and influence the research base nationally and internationally through leadership, advisory and member roles on a wide range of funding bodies, for example (excluding reviewer-only roles):

a) National Institute for Health Research

Developing and Enhancing Skills grants (**Bowen** panel member 2019-); Regional Advisory Committee for Research for Patient Benefit programme (**Walker & Worsley** South East and Central panel members 2017- & 2019-); Doctoral Research Fellowship (**Richardson** panel



member 2016-); Senior Investigator awards (**Richardson** panel member 2019-); NIHR/Health Education England Integrated Clinical Academic Programme Clinical and Senior Clinical Lectureship Awards (**Stokes** panel member 2020-).

b) Government

National Agency for Evaluation and Prospectus (ANEP), National Health Research Fund, Spain (**Portillo** panel member 2015-); Chief Nursing Officer for Scotland's Scottish Nursing, Midwifery & Allied Health Professional Research Award **(Latter** panel member 2015-); Republic of Ireland Health Research Board Clinician Scientist Post-doctoral Fellowships (**Stokes** panel member 2020-).

c) National Charities

Versus Arthritis Fellowships Committee (**Bowen** 2018-); Cancer Research UK Population Sciences Committee (**Brindle** panel member 2019); Stroke Association Awards (**Burridge** panel member 2010- and chair 2017-); Bowel Cancer UK Scientific Advisory Board (**Foster** member 2017-); Marie Curie Research Strategic Advisory Committee (**Latter** member 2018-); INSPIRE Foundation National Scientific Committee (**Kunkel** panel member 2018-); Versus Arthritis Physical Activity Advisory Committee (**Stokes** panel member 2019-).

d) International research organisations

EU Joint Programme Neurodegenerative Disease Research Funding Programme (**Bartlett** panel member 2018, 2019); European Organisation for Research & Treatment of Cancer, Quality of Life (**Darlington** member 2012-18, elected Chair 2018-); International Consultation on Incontinence (**Fader** panel member 2009-); Irish Cancer Society (**Foster** chair 2018); French National Institute for Cancer Research Scientific Review Panel (Foster 2020); Research Council of Norway (**Hughes** chair 2016; panel member, 2018, 2019).

4.2.2 Journal Editorships

Staff at all levels contribute to the research base through influential appointments to international peer-reviewed journals. For example:

a) Editors-in-Chief or equivalent

Journal of Tissue Viability (**Bader** 2011-); Dementia: International Journal of Social Research and Practice (**Bartlett** Co-Editor 2019-); Journal of Foot and Ankle Research (**Bowen** 2018-); Executive Editor, International Journal of Nursing Studies (**Griffiths** 2005-); Founding Editor International Journal of Nursing Studies Advances (**Griffiths** 2020-); Founding Editor European Journal of Oncology Nursing (**Richardson** 2003-).

b) Associate Editors

Journal of Clinical Biomechanics (**Bader** 2016-); Human Resources in Health (**Ball** 2018-); Journal of Foot and Ankle Research (**Bowen** 2010-18); International Journal of Nursing Studies (**Dall'Ora** 2017-); Nursing Open (**Portillo** 2018–); Implementation Science (**Rogers** 2009-); BMC Geriatrics (**Sadler** 2018-19); Clinical Rehabilitation (Stokes 2003-); BMC Health Research (**Walker** 2018-).

4.2.3 Learned Societies and Other Professional Organisations

Significant contributions to sustainability of the national and international research and disciplinary base are made by staff at all levels through leading roles in learned societies and major scientific organisations, including:

UK College of Podiatry Research and Development Committee (**Bowen**, Chair 2014-19); Association of Chartered Physiotherapists in Neurology (**Burridge**, President 2017-present); British Psycho-Oncology Society Executive Committee (**Calman**, member 2019-present);



International Standardization Committee for Continence Products (**Fader**, chair); British Psychosocial Oncology Society Executive Committee (**Foster** member 2016-present); American College of Sports Medicine Moving through Cancer Taskforce (**Grimmett**, behavioural science lead 2019-present); International Consortium of Rehabilitation Robotics Steering Committee (**Hughes** 2016-present); Joanna Briggs Institute Expert Reference Group on Infection Prevention and Control (**Prieto** 2020-23); Society for Back Pain Research (**Roberts**, President 2016); European Spine Society Advisory Board (**Roberts** member 2015–present); European Pressure Ulcer Advisory Panel Scientific Committee (**Worsley**, Trustee 2018-present; Chair 2019-present).

4.2.4 Academic Recognition and Honours

The magnitude of our staff's contribution to research and to the disciplines of nursing and allied health professions is reflected in national and international awards and prizes, including: College of Occupational Therapists Merit Award (Adams 2015); Institute of Physics and Engineering in Medicine Fellowship (Bader 2018); BioMedEng Legacy Prize (Bader 2018); Tissue Viability Society Fellowship (Bader 2019); Honorary Fellow of the Royal College of Nursing, (Ball); Fellowship of the European Academy of Nursing Science (Ball, Griffiths, Latter, Portillo); The College of Podiatry Meritorious Medal for outstanding contribution to the profession (Bowen 2014); NIHR Senior Investigator award (Griffiths 2017-22, Richardson 2018-2023, Rogers 2008-18); Mechatronics Paper Prize Award Winner (Hughes 2014-16); Sigma International Nurse Researcher Hall of Fame (Latter 2020); NIHR 70@70 Senior Nurse Research Leader (Prieto 2019-present); Royal College of General Practitioners Research Paper of the Year Award (Rogers 2016); Fellowship of Chartered Society of Physiotherapy (Roberts, Stokes 2013); OBE for services to physiotherapy (Stokes 2018); European Pressure Ulcer Advisory Panel Novice Investigator Award (Worsley 2018).

4.3 Broader contributions to the economy and society

4.3.1 Economic and societal benefits

Our impact strategy (§1.4) ensures that our research contributes significantly to broader economic and societal benefits. In addition to the national and international impact described in our ICSs, our contribution is further exemplified by: **Bridges** presented NIHR- and CLARHC-funded CLECC study findings to parliamentarians during Parliamentary Evidence Week (2020); **Latter, Campling, Richardson** and **Ewings**' research on community access to end-of-life medicines is informing NHSE plans for new community pharmacy services across England and national competencies for community pharmacists in Wales, through the Royal Pharmaceutical Society Wales; **Rogers, Vassilev** and **Portillo**'s European Commission and CLARHC-funded programme of research on using a social network tool (GENIE) to manage long term conditions, has been endorsed by NHS England and is used by >30 organisations in Hampshire - including Age UK and Alzheimer's Society - as well as internationally in multiple local authorities, hospitals and charities in Australia and Canada.

More junior staff have actively contributed to societal impact: **Campling** and ECR **Ewings**' research (with **Latter** and **Richardson**) on community access to end-of-life medicines is informing NHSE plans for new community pharmacy services across England and national competencies for community pharmacists in Wales; **Kunkel's** (with **Ashburn**) 2014 research on the benefits of dance for people with Parkinson's Disease informed an NIHR award-winning YouTube video, viewed >3000 times; **Murphy's** (with **Fader**) findings on the positive impact of a continence Product Decision Aid on confidence led to its inclusion in the Continence Product Advisor website, with >1M visits (ICS 03-02).

4.3.2 Shaping policy and practice

School staff influence policy and practice through high-level representation in a range of national and international agenda-setting organisations and groups. For example NHS Improvement Safe Staffing Advisory Group (**Ball, Griffiths** 2016-17); Macmillan Geriatric Oncology Expert Reference Group (**Bridges** Workforce Lead, 2014-17); Health Education England (**Fader, Richardson**, specialist advisors on clinical academic careers 2017-19); Expert advisor to All-Party Parliamentary Group on Continence (**Fader** 2014-20); NICE Safe Staffing Advisory Committee (**Griffiths** member 2015); Council of Deans of Health Research Advisory Group (**Latter** 2018-); Association of UK University Hospitals National Clinical Academic Careers Development Group (**Latter, Richardson** 2012-17); Royal Pharmaceutical Society Expert Advisory Group Commission on future models of pharmacy (**Latter** 2014); International Movement Screening Interventions Group (**Stokes,** lead 2014-); National Cancer Research Institute Living with and Beyond Cancer Group, Methodology work stream (**Wheelwright** 2020-).

4.3.3 Public engagement

School staff's public engagement activities promote dissemination, engagement with and impact of our research. We draw on the expertise of the University's PERu to strengthen our engagement strategies and activities, including winning funding awards for engagement projects: Hughes' (2017) project on connecting art students with stroke patients to produce a public artwork exhibition. Our research has regularly featured in national news, for example Griffiths, Ball and Jones' ICS03-01 highlights how their research influencing safe nurse staffing guidance received widespread media coverage in 33 outlets, including The Guardian (2015; 2019), Scientific American (2015) and El Pais (2015). Other examples include Vassilev's (2016) BBC4 Thinking Allowed interview on chronic illness narratives in Bulgaria and the UK, and Fader's (2015) interviews on catheter research broadcast on several BBC radio stations including Today on Radio4. We engage with the public using local media outlets: e.g. BBC Radio Solent on delayed prescribing research and public antibiotic use (Ellis 2016) and Covid-19 research study ENABLE (Calman 2020). Staff also connect the public with our research through engagement and hosting outreach events e.g. Smallpeice project (Warner, with School of Engineering) reaching ~250 primary and secondary school students, and LifeLab (Adams, Stokes with UHS and School of Education) as part of widening participation outreach, to ~170 primary and secondary school students.

4.3.4 Industry and Enterprise

Examples of impact generated through the School's industry collaborations and enterprise activities are exemplified in our ICSs, notably **Fader** et al (ICS03-02) focused on continence technology and **Bader** et al (ICS03-05) on technologies to maintain skin health and improve pressure ulcer prevention.

Industry and enterprise collaborations are led by the Faculty Associate Dean for Enterprise (**Slater-Jeffries**) and facilitated locally by the School enterprise champion (**Metcalf**). Partnerships with industry are supported by RIS together with the Faculty Enterprise and Impact Board which supports exploitation of Intellectual Property through patent and licensing panels.

The School has supported two patent applications: haptic stimulation apparatus (**Metcalf** 2015); and penile compression clamps (**Bader, Fader** 2018). The School has generated consultancy and commercial enterprise funding of £462k since 2014 and has gained enterprise funding from a variety of sources, e.g. **Worsley** funded by EPSRC impact accelerator funds (£21k) to develop public exhibits at Winchester Science Centre.

Business incubators such as the SETsquared Partnership have supported staff to write grants on developing interventions for active living (**Stokes**) and to prevent biofilms (**Wilks**). Two staff



(**Burridge, Fader**) have successfully received ICURe (Innovation to Commercialisation REF5a§2.3) awards to develop entrepreneurial skills and strengthen links with industry.

The University's FortisNet industry collaborative partnership is hosted by the Institute for Life Sciences and directed by **Adams** (2016-19). This interdisciplinary network of 13 different sectors and >220 individual members of clinical, academic and industrial partners aims to develop research, products and services to transform musculoskeletal health. Since 2016, 48 new projects and 35 business partnerships have been developed, including: a penile compression device for male urinary incontinence (**Fader, Macaulay** 2020); a clinical tool for analysing 3D gait kinematics (**Gavin, Warner**, 2019); an automated method of measuring posture in the workplace (**Stokes, Warner** 2017); outreach and public engagement: visualisation of an interactive system for testing and training manual tasks in astronauts (Space M-Mark) (**Burridge, Stokes, Turk 2017**); and Spidersole: prosthetics and augmentation (**Bowen** 2016).