

Institution: Keele University
Unit of Assessment: UoA2 Public Health, Health Services, and Primary Care
<p>1. Unit context and structure, research and impact strategy</p> <p>1.1. UNIT CONTEXT AND STRUCTURE</p> <p>Our submission to UoA2 reflects research undertaken by the Institute for Primary Care and Health Sciences at Keele University which, in 2020, was fully integrated into the School of Medicine (Head of School: Mallen, Director of Research: Van der Windt) - the largest and most research-intensive of the four Schools within the Faculty of Medicine and Health Sciences. In REF2014 our UoA2 submission was ranked 6th of 32 in Public Health, Health Services & Primary Care with 91% outputs rated 3-4* and our impact case studies rated 4*.</p> <p>Keele University's health research is primarily located in the Faculty of Medicine and Health Sciences (FMHS), which was recently restructured to integrate research and education within four Schools - Medicine; Allied Health Professions; Nursing and Midwifery; Pharmacy and Bioengineering - to optimise capacity building and career development across all health disciplines, to increase visibility and impact of health research, and to calibrate Unit aims against the Keele Research Strategy. Cross-cutting research themes, led by senior researchers operate across the Schools to optimise interdisciplinary working. The Faculty Research Committee, chaired by the Dean for Research, oversees strategic development, infrastructure, capacity building, sustainability, and visibility. Each School in the Faculty has a Director of Research to promote, develop, and coordinate research activity.</p> <p>The research infrastructure includes:</p> <ul style="list-style-type: none"> • Research and Innovation Support Enhancement (RaISE) team, providing support for research development, contracts, research integrity, and regulatory compliance • NIHR-accredited and UKCRC-fully registered Keele Clinical Trials Unit • Internationally recognised patient & public involvement and engagement (PPIE) • Impact Accelerator Unit, established during this assessment period to facilitate knowledge mobilisation and drive early adoption of best evidence into policy and practice <p>Our mission is to conduct interdisciplinary research focusing on long-term conditions with the highest impact on health and well-being globally, building on our world-leading expertise in musculoskeletal health, mental health, and methodological strengths in prognosis research, trials, evidence synthesis, and mixed-methods research. Our work is nested strongly in primary, community, and social care, ensuring maximum benefit to patients, their families and wider society.</p> <p>The School of Medicine hosts the national Primary Care Centre funded by Versus Arthritis (Hay), the University-wide Institute for Global Health, and three cross-Faculty research themes: Musculoskeletal Health (Dunn), Mental Health and Well-being (Chew-Graham, Farooq), and Health Professionals Education Research (LeFroy, Yeates). The School of Medicine (SoM) (3rd in the 2020 Guardian ranking of places to study medicine) offers research-led teaching and supervised undergraduate research placements, including ASPIRE studentships and intercalated research-focused MPhils. Academic career pathways are supported through our participation in the NIHR Integrated Academic Training Programme (Lead: Protheroe); leadership of the Wellcome Clinical PhD Programme for Primary Care, and capacity development programme of the NIHR School for Primary Care Research (Mallen); and dedicated support for staff and students applying for external fellowships.</p> <p>The research teams consist of primary healthcare professionals (including general practitioners, rheumatologists, pharmacists, nurses, physiotherapists and mental health specialists) working across traditional boundaries, highlighting our forward-thinking vision to improve care in primary, community, and social care. The teams work together with local Clinical Commissioning Groups, Community Health Trusts, Sustainability and Transformation Partnerships, and the NIHR Clinical</p>

Research Network to set priorities, design, and deliver our studies. **Research partnerships** are formalised through the Primary Care Research Consortium (working with health and care partners in Staffordshire) and expanded through the launch of Keele **Deal | Health**, a commitment between Keele University and local health and care partners to address the region's health and care priorities.

We are members of the **NIHR School for Primary Care Research** since 2010, with Mallen becoming Director in 2021. We are the only group to hold more than one primary care NIHR Research Professorship (Mallen, Foster). Four of our senior team hold NIHR Senior Investigator awards (Foster, Dziedzic, Hay (Emeritus), Croft (Emeritus)). Our success in driving research dissemination and impact is recognised through three NIHR Knowledge Mobilisation Fellowships (Dziedzic, Stevenson, Swaithes).

1.2. ACHIEVEMENT OF STRATEGIC AIMS

OVERVIEW: Our UoA2 submission in REF2014, and our main strategic aim for this period, reflected a focus on **musculoskeletal health and primary care**, where we have continued to make significant contributions to new knowledge underpinning improvements in musculoskeletal health and care, consolidating our position as international leaders in this field. A second aim, strategic expansion of our research portfolio, has been achieved through two new research groupings in **mental health & well-being**, and **prognosis research**. A third aim, to strengthen knowledge translation, has been achieved through a vibrant Impact Accelerator Unit with local, regional, national, and international reach, embedded across our research programmes. Overall, our grant income (£54.8M) is 156% higher than REF2014. Achievements against these three strategic aims are evidenced below.

Aim 1: Reduce the impact of musculoskeletal pain and arthritis in individuals and populations (Hay, Mallen)

Our Arthritis Research UK/Versus Arthritis national centre of excellence for primary care research, established in 2008, was renewed in 2013 and 2018. We are partners in the MRC/Versus Arthritis Centre for Musculoskeletal Health and Work (Walker-Bone, Southampton, £2.2M, 2019-2024), and, with colleagues at the Haywood Hospital, gained recognition as a EULAR European Centre of Excellence for Rheumatology Research. Our researchers became panel members on international Lancet Commissions on low back pain (Foster, Croft) and osteoarthritis (Dziedzic, Peat).

Develop tools and new knowledge to support surveillance and monitoring of musculoskeletal health and care (Peat, Jordan, Yu, Dunn).

Using national and regional primary care-linked databases, we have published estimates of **trends and inequalities in the consultation incidence, prevalence, outcomes, and management** of musculoskeletal conditions, including new UK estimates in children and young people. These have featured in policy documents, clinical guidelines, Global Burden of Disease modelled estimates, and are being considered by Public Health England for inclusion within national indicator dashboards. We highlighted **increased prescribing of long-term opioids for musculoskeletal pain** and quantified increased risks of adverse events (Ashworth *Pain* 2016; Richardson *Eur J Pain* 2018; Yu *Rheumatol* 2020), influencing pain management guidelines internationally, and feeding into a new research programme to reduce inappropriate use. Collaborating with Oxford University and Versus Arthritis, we led the development, validation, and implementation of **a new patient-reported musculoskeletal health outcome measure - MSK-HQ** - now recommended for routine use by NHS England and the Chartered Society of Physiotherapy, translated into 8 languages (9 in development), and 440 licenses issued to health organisations since 2017 (150 to NHS trusts).

Improve the content and organisation of musculoskeletal care (Foster, Hay, Roddy, Van der Windt)

Following the success of our STarTBack model of **prognostic stratification with matched treatment pathways** for low back pain (*see Impact Case Study*), we have sought to extend this approach to a wider set of painful musculoskeletal conditions (Foster, NIHR PGfAR £1.9M, 2014-2020), incorporating a RCT of 1200 participants (24 general practices). We are now also developing and evaluating models of **stratified care based on diagnostic information and predictors of treatment effect** to improve care and outcomes for patients with sciatica (Foster, NIHR HTA £1.2M 2014-2020) and painful shoulder conditions (Van der Windt, NIHR PGfAR £2.7M 2018-2024). Strong qualitative and mixed methods expertise, led by Chew-Graham and Jinks, aimed at understanding lived experiences, intervention development and process evaluation, together with expertise in pilot and feasibility studies (Lancaster) are critical to their success.

A large programme of trials undertaken within the assessment period evaluated **better models for delivering primary care** for people with musculoskeletal conditions:

- a novel vocational advice service in general practice reduced time off work indicating a potential saving of £500M from an investment of £10M (Wynne-Jones, *Pain* 2018)
- a cluster RCT (n=1851) implementing model osteoarthritis consultations increased the uptake of NICE-recommended core management (Jordan, *ARD* 2017; Dziedzic, *Implementation Sci* 2018; Hay, *NIHR Journals Library* 2018)
- local steroid injection leads to faster recovery of symptoms than splinting for mild-moderate carpal tunnel syndrome (Chesterton, *Lancet* 2019)
- naproxen did not provide superior pain relief vs low-dose colchicine for people with a gout flare, but had fewer side effects, supporting its use as first-line treatment in the absence of contraindications (Roddy, *ARD* 2020)

Of 66 studies featured in the NIHR Themed Review 'Moving Forward' 22 were Keele-led. Our trials on stratified care for low back pain, vocational advice in primary care, and direct referral to physiotherapy were identified as priority interventions in Public Health England's Return on Investment tool for local commissioners.

We have secured major national and European research funding awards in open competition for ongoing projects aligned with our strategic aims:

- Developing and evaluating a clinical pharmacist intervention to reduce over-prescribing of opioid analgesia (Mallen, £2.4M NIHR PGfAR, 2019-2023)
- Multi-centre trial of braces for knee osteoarthritis in primary care (Peat, £1.6M NIHR HTA, 2018-2022)
- European collaboration to develop an online platform based on prognostic risk prediction to improve care for neck and back pain (€5.1M, £400K for Keele, Horizon 2020, 2018-2020).
- New trial of a brief vocational advice intervention in primary care for patients receiving a Fit Note (Foster, £1.5M NIHR HTA, 2019-2023)

Aim 2: Strategic expansion of our primary care and health services research portfolio

Encouraged by renewed membership of the NIHR School for Primary Care Research, national research priorities, and the needs of NHS and social care partners, we expanded our research and impact portfolio into two areas: (i) mental health and wellbeing, and (ii) prognosis research.

Mental health and wellbeing (Chew-Graham, Farooq)

In close collaboration with Midlands Partnership Foundation NHS Trust, who invested in 2 Professorial posts in Psychiatry (Sumathipala, 2014-; Farooq, 2015-) and junior posts, our new programme is designed to address pressing mental health challenges:

Recognising and managing anxiety and depression in people with other long-term conditions: Our cluster RCT provided strong evidence against any benefit of introducing routine anxiety and depression screening in older adults presenting with persistent pain in general practice (*Mallen, PLOS Med* 2017). We designed and assessed the acceptability and feasibility of an integrated,

nurse-led model of care for the management of anxiety and depression in older adults with long-term conditions to be evaluated in a future, large-scale trial.

Prognosis and management of severe mental illness: Co-produced with our experts in prognosis research methods, we developed a clinical tool for the prediction and early identification of treatment resistance in people with first episode schizophrenia (Farooq, NIHR RfPB £150K, 2020-2021). As active contributors to Keele's emerging Institute for Global Health, we are evaluating a community-based intervention to improve treatment adherence and reduce the treatment gap for schizophrenia in Pakistan (Farooq, MRC £517K, 2018-2021).

Early detection of dementia progression: Our first study on dementia (Jordan, Dunhill Foundation £140K, 2018-2020) has identified markers of dementia-related health and progression using information available from electronic medical records. Future research will evaluate these markers for early identification of individuals at risk of faster progression who may benefit from enhanced care.

Our researchers have contributed as co-investigators to national collaborations on self-harm in children and adolescents (*Morgan BMJ 2017*) and evaluating models of care for people with mental-physical comorbidity and severe depression (*Rahman JAMA 2016*, *Kessler BMJ 2018*, *Camacho Br J Psych 2018*).

Prognosis research (Riley, Mamas)

Building on the MRC PROGRESS Partnership we made Professorial appointments in prognosis research and individual patient data meta-analysis (Riley, Biostatistics 2014-) and use of national registry/electronic health records (EHR) data (Mamas, Cardiology 2015-). This has attracted diverse funding (*MRC, Nuffield Foundation, British Heart Foundation, EU*) and led to publication of more than 500 papers, including a series of original contributions on methodological advances (i.e., *Stat Med; Stat Method Med Res*), highly-cited guidance for the international research community (i.e., PRISMA-IPD, *JAMA 2015*, >500 citations), and new actionable knowledge on:

- improvements and inequalities in mortality related to variable use of transradial access during percutaneous coronary intervention in UK (Mamas *Circulation 2016*)
- poor prognosis among patients presenting to primary care with undiagnosed chest pain (Jordan *BMJ 2017*)
- relative patterns of treatment and outcomes in patients with concomitant cancer admitted for acute myocardial infarction (Mamas *Eur Heart J 2019*)
- risk prediction models for pregnancy-related complications (e.g., Sultan *BMJ 2016*, iWIP group *BMJ 2017*), future hip/knee replacement (Yu, *ARD 2019*), venous thromboembolism (Ensor *HTA 2016*), and more.

Aim 3: Scale up and accelerate the translation of research findings into practice

We established an Impact Accelerator Unit (IAU) in 2015, led by Prof Dziedzic (NIHR Senior Investigator and Professor of Musculoskeletal Therapies), with a core team covering engagement and partnerships, clinical leadership and expertise, clinical champions (i.e., NICE Knowledge Mobilisation Fellows), Q Community membership, and project management. Strong representation of patients and members of the public is ensured by a dedicated PPIE group for Knowledge Mobilisation. This Unit has rapidly established extensive regional, national, and international networks, driving the successful implementation regionally, nationally, and internationally of models of stratified care (see *Impact Case Studies*).

In response to COVID-19

In 2020 our teams joined and led activity to generate evidence to inform the response to the COVID-19 pandemic:

- contributing to research led by the National Institute of Cardiovascular Outcomes Research (NICOR) together with NHS E&I and NHS Digital to enable continuous flow of data for SAGE

and NHS E&I. The work identified the large fall in hospital admissions and interventions during lockdown (*Mafham Lancet 2020*).

- producing new evidence and contributing to a Royal College of General Practitioners (RCGP) module and Royal Society of Medicine seminar on the experience of long COVID; collaborating on MRC-funded investigation of COVID-19 impact on people with severe mental illness in South Asia.
- leading a European-funded investigation of COVID-19 impact in people with musculoskeletal pain (SNIFE, £100k, 2020-2021). Our IAU and Research User Group co-created evidence-based Top Tips for people with chronic musculoskeletal pain during the COVID-19 pandemic (<https://www.keele.ac.uk/pcsc/research/impactacceleratorunit/toptips/>).
- contributed to a 'living' systematic review of prediction models for the diagnosis and prognosis of COVID-19 (*Wynants BMJ 2020*).
- Recruiting participants to the REal-time Assessment of Community Transmission (REACT-2), led by Imperial College London, and to the Novavax vaccination trial.

1.3. FUTURE STRATEGIC AIMS FOR RESEARCH AND IMPACT

Our future research and impact strategic priorities have been informed by consultation with patients, clinical partners, and other stakeholders. They are aligned with NHS/NIHR's strategic priorities regarding prevention, empowering patients, a focus on frailty and multimorbidity rather than individual disease; breaking down barriers of care provision and designing innovative models of care in underserved areas of greatest need.

The **5-year strategic aims** are to provide evidence to underpin **3 shifts in primary, community, and social care** across health conditions:

(1) From a reactive approach to treating episodes as they present in primary care, towards proactive case finding and preventative strategies

Our research focus will move to producing new actionable knowledge earlier in the disease course, earlier in the life course, and at the interface of primary care and public health. With the recent creation of the **Keele Institute for Social Inclusion**, and our work with Public Health England, we will seek to further grow and develop our work in public health and health inequalities.

Funded/planned flagship projects: improving uptake of fracture prevention treatment (Paskins NIHR Career Scientist award, 2019-2023); using enriched integrated multi-level data for local health intelligence (Peat, Nuffield Foundation, 2020-2025); case finding and intervention in children/adolescents to prevent long-term persistent pain (Dunn, NIHR PGfAR submitted); proactive assessment and management of depression and cardiovascular risk in adults with inflammatory arthritis.

(2) From 'a one size fits all' approach, to offering people individualised care, matched to their characteristics, prognosis, and likely response to treatment

We will combine our expertise in prognosis research and health intelligence, intervention development and trials, and knowledge translation, to move beyond risk stratification and develop, evaluate, and implement models of individualised care across a range of disabling long-term conditions.

Funded flagship projects and programmes and other planned work: identifying predictors of treatment response in shoulder pain (van der Windt, NIHR PGfAR, 2018-2025); developing online platforms and digital support tools to facilitate successful implementation of individualised care for musculoskeletal conditions (planned submission to NIHR-AI); prediction tools and models in dementia, treatment resistance in first-episode schizophrenia, and post-natal anxiety and depression to evaluate their clinical utility and impact on management and outcomes; evaluating the impact of comorbidity and frailty on risk stratification, treatment selection and outcomes in people with cardiovascular disease.

(3) Towards new models of care, delivered by multidisciplinary teams of primary and community care professionals, offering more accessible care for patients with complex problems

Our research will underpin an effective response to the domestic challenge of diversifying the primary care workforce and promoting equitable access. Our new programme of global health research will build on strong international and interdisciplinary collaborations to co-create research with partners in low- and middle-income countries to design, implement, and evaluate interventions to improve mental health and wellbeing.

Funded flagship projects and programmes and other planned work: design and evaluate a new approach using clinical pharmacists in general practice to support patients to reduce/stop opioids (Mallen and Ashworth, NIHR PGfAR 2019-2024); evaluating a community-based intervention for improving treatment adherence and reduce the treatment gap for schizophrenia in Pakistan (Farooq, MRC, 2018-2021); co-develop, implement and evaluate interventions to promote early diagnosis and treatment seeking behaviour, decrease social isolation and stigma, empower communities and improve treatment pathways for cutaneous leishmaniasis in underserved communities across Brazil, Ethiopia and Sri Lanka (Price & Dikomitis, NIHR Global Health, £4M, 2019-2023).

We will create a **Methodology Hub** to increase visibility and support our ambition for methodological excellence in specialty areas (epidemiology, prognosis research, EHR research, trials, evidence synthesis and knowledge mobilisation) with a commitment to open science and research integrity. The Hub will enable critical mass in methodological expertise; encourage innovation; support career development, scholarship and skills in methodology; and offer more opportunities for the development and delivery of teaching and training in research methods. The Hub will work together with the Keele Clinical Trials Unit, Research Design Service, and Impact Accelerator Unit to support the design of high-quality research that will underpin improvements and innovation in care.

2. People

Research in the Institute for Primary Care and Health Sciences is delivered by academic/clinical-academic staff, Professional Services and Support (PSS) staff and postgraduate research (PGR) students. In keeping with Keele University's founding ethos on 'the pursuit of truth in the company of friends' we emphasise team science and investment in career progression for clinical and non-clinical staff across all stages. Our academic/clinical-academic staff represent a wide range of professional backgrounds and disciplines, including general practice, physiotherapy, rheumatology, biostatistics and epidemiology, social sciences, health services research, occupational therapy, radiography, nursing, psychology, psychiatry, information science. We have made joint appointments with local clinical services in general practice, rheumatology, psychiatry, physiotherapy, pain medicine, nursing, cardiology, nephrology which serve to anchor our research in the realities of contemporary practice and ensure our strategic priorities meet those of the NHS.

The current submission represents a substantial increase (180%) over REF2014 in the number of staff submitted (9.2 to 25.7FTE). The success of our strategy over REF/RAE cycles is reflected in our senior staff - almost half our submitted Professors/Readers gained their PhDs at Keele - and they collectively hold multiple primary care NIHR Research Professorships (Mallen, Foster) and NIHR Senior Investigator awards (Foster, Dziedzic, Croft (Emeritus), Hay (Emeritus)). Chew-Graham chairs the Society for Academic Primary Care and our strengths in research impact and close NHS partnerships have attracted three NIHR Knowledge Mobilisation Fellowships (Dziedzic, Stevenson, Swaithes).

We are recognized as national leaders in primary care research training, with Mallen as the NIHR School for Primary Care Training Lead (2015-) and a member of the NIHR Research Development Capacity Group and Chair of NIHR Incubator in Primary Care, Foster as Chair of the HEE/NIHR Integrated Clinical Academic (ICA) Doctoral Research Fellowship programme for nurses,

midwives, AHPs, pharmacists and clinical scientists. We lead the Wellcome Trust PhD Programme for Primary Care Clinicians in collaboration with Cambridge, Oxford, and Southampton Universities (Director, Mallen, 2017-) and were members of the NIHR Strategic Review of Training Group (Mallen, Foster).

Our staffing strategy is informed by Keele's People Strategy and underpinned by investment in staff development, the offer, wherever possible, of stable employment contracts, provision of flexible working arrangements, access to the Academic (Maternity) Returners Fund, and the creation and maintenance of a collegiate, team, research culture that maximizes opportunities for career progression. Our Fellowships Committee proactively identifies and supports applications to key funders. This is critical to support academics from underrepresented groups. Early-career researchers, or those returning to research after a period in which they have prioritized other aspects of their role, are allocated a mentor to advise on developing a competitive research profile and research career advancement.

Support for PGR students. PGR students' needs and circumstances are diverse. In recognition of this:

- We offer all funded studentships as full- or part-time (51% of our PhDs register part-time). All prospective students are interviewed by at least 2 academics, who have appropriate Recruitment and Selection and Equality and Diversity Training.
- We have established a fund that PhD students on internal bursaries can apply for at the end of their 3-year project when they have encountered unforeseen obstacles (taken up by 12 students, all of whom went on to successfully submit their thesis).
- We have a volunteer student representative group who represent the student body internally and externally for the Medical School, support Equality, Diversity, and Inclusion (EDI) activities, organise student-led and invited speaker sessions on PGR-related topics such as doctoral progression, writing a thesis, viva preparation, and general research skills (e.g. presentation skills, systematic reviewing).
- We have two PGR tutors to provide pastoral care for all PGR students and extra support for any training or disability needs.
- We offer competitive salaried PhDs to healthcare professionals who wish to undertake PhDs while maintaining clinical interests (2 physiotherapists, 1 dietician, and 1 GP to date), and are part of the Wellcome Trust PhD Programme for Primary Care Clinicians enabling the next generation of academic primary care clinicians to complete doctoral studies part time (2 currently). We also host academic trainees from foundation years to clinical lecturers as part of the Integrated Academic Training Pathway with posts across primary care and medical specialities. We encourage medical undergraduates to participate in research via exposure to research studentships. Many of our students have gone on to present, publish, and subsequently register for higher degrees.
- Our staff provide formal research training modules in research methods, statistics, epidemiology, evidence-based practice, and research ethics. Of particular note are our short courses that offer internationally renowned training to our postgraduate research students. These short courses include: *A Practical Introduction to Running Randomised Clinical Trials; Planning & Reporting Pilot and Feasibility Trials; Prognosis Research in Healthcare Summer School; Statistical Methods for Risk Prediction & Prognostic Models; Statistical Methods for Evidence Synthesis of Individual Participant Data*
- Training and development plans are individually tailored, with reference to the Vitae framework, and every PGR student is provided with an annual research fund of £800 for training and conference participation.
- In the Postgraduate Research Experience Surveys, Keele has consistently had higher responses and achievement scores than Sector benchmarks on all areas (ranked 10th of 103 institutions in 2019), on resources, research culture, research skills, and professional development. Primary care is particularly highly rated on quality of supervision (94%) and resources (97%) with an overall score of 100% in 2019.

There are robust procedures in place to monitor and support PGR student progress, aligned to Keele's Code of Practice for Research Degrees, and overseen by a Faculty Postgraduate

Research Committee, supported by the Keele Doctoral Academy. All students have at least two supervisors, chosen to provide both subject-matter and methodological expertise, and are allocated a PGR advisor, as a source of support independent of the supervisory team. PGR students are encouraged to gain generic as well as subject-specific skills to equip them for their future career. PGR students take a lead role in organising the Annual Postgraduate Research Symposium, which showcases PGR research through a combination of oral presentations, posters, turbo talks and 3-minute thesis competition, with students awarded prizes for scientific quality and dissemination to a lay audience, involving our patient and public contributors. Students are also encouraged to present their work institutionally, nationally and internationally. With support from staff, students have organized two national conferences in statistics hosted at Keele (2015, 2017) and regional meetings (e.g., Midlands RCGP conference).

All doctoral supervisors are required to be research-active at the time of supervising doctoral students, undertake formal training, and undergo a period of 'probationary' supervision under the guidance of an experienced supervisor.

Supporting progression and promotion of early and mid-career researchers. Keele University was one of the first Universities to sign up to the new Concordat to Support Career Development. We successfully renewed our HR Excellence in Research Award in 2020 and it was confirmed that the institutional report and action plan is fully in line with the Human Resources Strategy for Researchers incorporating the Charter and Code. The Unit has encouraged staff and student participation in Careers in Research Online Surveys and Principal Investigators and Research Leaders (CROS/PIRLS) surveys to ensure that their feedback and experiences are incorporated into the institutional actions. The Researcher Development Framework is linked in our appraisal documentation to enable and enhance research development discussions.

We have a strong track record in supporting the progression and promotion of early career researchers (ECRs), recognizing that retaining and developing the most talented ECRs in our Schools is a central part of our staffing strategy. High levels of staff retention (90%) illustrate the success of this strategy. Of 31 staff in the current submission, 10 were recently completed/registered PhD students and 3 were ECRs at Keele at the time of REF2014. In addition to taught modules, we offer journal clubs, internal and external seminar programmes, advanced methodology seminars (with both national and international speakers), and a series of workshops on systematic reviews and evidence synthesis. SoM hosts several highly successful international short courses (clinical trials, prognosis research, individual patient data meta-analysis, and prediction modelling), which are attended by postgraduate students, methodologists, and healthcare researchers from across the world. We contribute to the UK-RiME network and mentorship programme for early career researchers, hosted by the Arthritis Research UK Centre of Excellence in Epidemiology. Additional initiatives include:

- Linked to our commitment to EDI we have developed a more transparent, systematic process for identifying staff for promotion based on their expertise, experience, and appraisal
- An annual appraisal process with an embedded future research plan element
- Increasing awareness of processes for promotion, i.e., by actively encouraging staff to attend University promotion workshops
- Mentoring by senior academics to help potential applicants strengthen their CVs and plan career progression
- A dedicated Fellowships Committee, responsible for supporting personal fellowship applications through actions such as independent review and feedback on applications and CVs and mock interview panels with senior researchers; a successful NIHR Clinician Scientist award (Paskins) is an example of the success of this strategy
- Making funding available for staff development, e.g., funding exchange visits with international collaborators; one-to-one mentorship and coaching
- Research-only staff are encouraged to submit for promotion to Senior Research Fellow, where criteria focus on demonstrating excellence in research

Leadership opportunities and training. The expansion of research programmes across our four Schools; Medicine, Pharmacy & Bioengineering, Allied Health Professions, and Nursing and

Midwifery together with growth of Keele Clinical Trials Unit have provided opportunities for sharing leadership functions, delegating responsibilities, and creating promotion opportunities for both research and PSS staff. Staff have been supported in leadership training schemes via NIHR Academy, AURORA leadership development programme for women, and Advance-HE.

We aim to offer stable employment contract arrangements where possible, which is unusual in units largely funded by multiple, 2- to 5-year grants. Indefinite contracts are the general form of employment (90% staff in senior positions: 39% of academic/research staff at Research Assistant to Lecturer posts in this UoA). Fixed-term contracts are only used where there is a legitimate reason. Fixed-term staff have equal access to all staff processes and benefits, as is set out in our Fixed-Term Working Policy and Procedure. Appraisals are carried out for fixed-term staff within the unit and discussion focuses on support that could be provided to secure indefinite employment in line with their individual future career plans. Clinical academic staff are more likely to be on fixed-term contracts (FTCs). Nearly all clinicians who are on FTCs are on research-only contracts and have successfully applied for a clinical academic fellowship for a fixed period.

Equality, diversity, and Inclusion. Keele University holds a Race Equality Charter Bronze award, an institutional Athena SWAN Bronze award, is a Stonewall Diversity champion, and participates in the Disability Confidence scheme. Each of the 4 Schools within our Faculty have an EDI Working Group, with specific responsibility for equality and diversity. Primary Care has held an Athena SWAN Silver Award continuously from September 2013 (renewed November 2018-October 2022), and have successfully increased the proportion of women promoted to senior positions. Feedback from the Athena SWAN Charter panel particularly highlighted our support for **career development, not only for academic staff, but also for personal services and support (PSS) staff** including women living with pain and arthritis, who have been able to join and progress their careers as part of the PPIE team. The other 3 Schools within the Faculty hold bronze awards.

The EDI working groups, whose membership reflect staff and students in terms of gender, race, and other protected characteristics, represent different levels of seniority among research and PSS staff. The working groups leads on initiatives for staff and students related to career progression and promotion; training opportunities; health and well-being at work; and awareness of EDI principles (e.g. health and well-being weeks, unconscious bias training, and seminars and workshops related to international events, such as LGBT history month; international day for Elimination of Racial Discrimination; Transgender Visibility; Women's day; Men's Health). Awareness and impact of these activities is periodically evaluated. In 2020 we appointed well-being champions in each School. The EDI Working Group reports directly to the School's Senior Management teams through the Chair of the Working Groups and the school EDI lead is a member of the faculty EDI committee.

Working with the University's REF Code of Practice (reviewed by the University's EDI steering group), we have ensured that the selection of staff and outputs has been on objective criteria, including workload allocation models, and is overseen by a committee representing all Schools in the Faculty, chaired by the PVC for Research and Enterprise. Staff responsible for decision-making in the REF have undergone formal training in equality, with a particular emphasis on raising awareness of unconscious bias.

3. Income, infrastructure and facilities

3.1. INCOME

Our research income has significantly increased, by 156% for this REF period to £54.8m.

Renewal and extension of our Versus Arthritis Centre of Excellence award (£2.9M), researcher-led Programme Grants for Applied Research secured in open national competition (3 Keele-led programme grants, total value, £7M), and funding accessed and leveraged through membership of major national and regional NIHR consortia (NIHR School for Primary Care Research, West Midlands CLAHRC/ARC) represent important sources of research income. Building on our strong track record in primary care clinical trials, we committed to improving competitiveness in the NIHR

Health Technology Assessment programme, particularly response-led opportunities aligned with our clinical expertise, with some notable success (5 Keele-led multicentre trials, total value of awards made between 2013-2020, £6.8M).

Together these major research programmes and projects provide stability and opportunities for collaboration, interdisciplinary working, and career development. However, independent advisory panels noted our potential vulnerability to over-reliance on NIHR and Versus Arthritis funding. Important to our future sustainability therefore was to diversify our research income sources. Successful applications in national and international competition with a combined total award value of over £10M to European Union and other European streams, UK charities (Nuffield Foundation, Dunhill Medical Trust), Wellcome Trust, and global health research funding from the Medical Research Council, Arts & Humanities Research Council, and Global Alliance for Chronic Diseases, demonstrate a high degree of success towards this objective.

3.2. INFRASTRUCTURE AND FACILITIES

Our research and infrastructure staff are co-located within **purpose-built offices in the David Weatherall Building**. The building was the result of significant investment from the Wellcome, Dinwoodie, and Dunhill Trusts. In 2015, Keele University invested a further £3M in the David Weatherall building to accommodate growth, providing an excellent working environment for our staff and students. Since early 2017 all staff are housed in our expanded facilities, which has allowed us to expand facilities for meeting rooms, offer dedicated facilities for PGR students with access to infrastructure, allocate space for a well-being room (i.e., for mothers to express milk) and staff room, and offer possibilities for stand-up working and informal catch-ups (meeting pods) in open plan offices.

Patient and public involvement and engagement (PPIE). First established in 2006 we are a trailblazer with an established structure of over 163 lay members working on over 150 research projects, we lead the way nationally and internationally in PPIE in research and implementation (Dziedzic, Jinks), developing how patients and the public are involved in priority setting, research design and implementation of research. Regionally, we lead PPIE for the Midlands Health Innovation and for West Midlands Patient and Public Involvement and Lay Accountability in Research (PILAR) group. Nationally, we are the Testbed for INVOLVE Quality Standards of PPIE within the NIHR School for Primary Care, we chair PPIE for the national Research Design Service and Public Involvement Community. We hold membership of the European League Against Rheumatism Study Group for Participation and the Cochrane Training Development Group. We were co-applicants in the RCUK SEEK-PER study to increase the uptake of Public Engagement practices across the Institute. The team comprises a PPIE Project Coordinator (Higginbottom), PPIE Advisor (Rhodes), Project Support and Knowledge Mobiliser (Campbell), along with academic leadership (Blackburn: National Lead for PPIE Research Design Service) and senior academic oversight (Dziedzic, Director IAU). The PPIE team is supported by funding from Versus Arthritis, NIHR Applied Research Collaborative West Midlands (ARC), NIHR Research Design Service (RDS) and Keele University's Public Engagement Champions programme.

Impact Accelerator Unit (IAU). We established the IAU in 2015 to have a positive and sustained impact on public health, health and social care, by supporting timely movement of Keele's health research into practice, with a strong emphasis on primary care. The IAU is led by Prof Dziedzic (NIHR Senior Investigator; Professor of Musculoskeletal Therapies) with a core team covering engagement and partnerships, clinical leadership and expertise, clinical champions e.g., NICE Fellows; Q Community membership, project management and coordination, and health informatics. Strong representation of patients and members of the public is ensured through a dedicated PPIE group for Knowledge Mobilisation called the LINK group (Lay Involvement in Knowledge Mobilisation). The IAU's activity reflects both stakeholder-led and strategic, co-created priorities drawing on extensive regional, national, and international networks and collaborations. Our IAU is part of the West Midlands Knowledge Mobilisation Collaboration, a partnership between knowledge mobilization colleagues at Keele, Birmingham City, and Warwick Universities and the Collaboration for Leadership in Applied Health Research and Care (CLAHRC) (now ARC) West Midlands. Included among priority projects undertaken by the IAU since 2015, have been the

successful implementation regionally, nationally and internationally of models of stratified care for back pain and the core management of osteoarthritis in primary care (see our Impact Case Studies). Patient contributors have actively contributed to and co-authored all our Impact Case Studies.

Keele Clinical Trials Unit. We house Keele's NIHR-accredited and UKCRC-registered Clinical Trials Unit (Director: Hay (2013-2016; Foster (2016-2019), Lancaster (2019-)). We have earned a reputation internationally for the delivery of large multicentre pragmatic trials, having conducted 32 clinical trials recruiting over 9000 participants in musculoskeletal care alone since 2012 (combined grant income of >£20M) while pioneering computerised 'pop-up' templates for point of care recruitment. Our strengths are stratified care RCTs, the development of complex interventions in primary care, and the design and execution of pilot and feasibility studies (i.e., *Eldridge, Stat Meth Med Res 2015*).

Centre for Prognosis Research. Riley with Croft, Snell, Jordan and Van der Windt have built a longstanding track record in prognosis research. Based on outputs from the MRC-funded PROGRESS partnership (2012-2015), the Centre was established in 2016 to generate and support high quality applied prognosis research, evidence synthesis and methodological innovation to inform decision-making, improve patient outcomes, and increase efficiency of health care. The PROGRESS framework for prognosis research has been recommended by funders, requesting applicants to adhere to the framework when developing research proposals. The team hosts a series of highly successful international short courses on prognosis research, prediction modelling and IPD meta-analysis (>100 participants per year; 20-30% international), published a textbook (OUP 2019), and has led capacity building in prognosis research (Burke, Ensor, Sultan, Yu). Methodological papers have been published in high impact journals (*BMJ, Statistics in Medicine*) regarding **sample size calculation for prognostic models** (*Riley Stats Med 2019*), **evidence synthesis in prognosis research** (*Ensor Stat Meth Med Res 2018, Debray Stat Meth Med Res 2019*), and **risk of bias assessment tools for prognosis research and IPD meta-analysis** (*PROBAST 2019, PRISMA-IPD 2015*).

Our work in prognosis research and health intelligence is underpinned by access to large healthcare datasets. Keele University has 'gold' access to national primary care EHR data with linkages (CPRD), and we house national and international cohort data from patients with cardiovascular disease, with a focus around acute myocardial infarction, heart failure, coronary and valvular heart disease and stroke (e.g. British Cardiovascular Interventional Society database for PCI and TAVR; Healthcare Cost and Utilization Project, which includes longitudinal data from close to 500 million hospital care episodes). We have developed enriched local and regional cohorts with anonymized EHR linked with consent to patient-reported outcome measures obtained through population surveys (i.e., PRELIM-HILL, n=19,500) and we host a database of routine consultations in North Staffordshire general practice (CiPCA, n=110,000) to provide bespoke data for our health and care partners, supporting commissioning and pathway planning with local data.

Northern hub of the NIHR West Midlands Research Design Service, providing methodological and infrastructure support to research and PPI in the region and strengthening collaborative working with clinical partners.

The **Research and Innovation Support Enhancement (RaISE)** team was established in 2017 and draws together professional services staff with expertise in research development, governance, integrity, ethics, contracts, public engagement, commercialisation and impact. The team provides support for the development of research and innovation projects involving Keele University and its external partners. Establishment of the RaISE team has enabled a joined-up approach to research and innovation support, helping us to improve the quality and effectiveness of our research proposals, implementation and impact.

Open Science and Research Integrity

We are proud of our track record in open science. Since 2004 we have published protocols in open access sites, made available, free of charge and without restriction, all clinical codelists that

our researchers have derived. Since 2009 we have successfully operated a system of 'reviewed access' to all anonymised datasets we have created and curated, a system that was chosen as an exemplar in national guidance endorsed by multiple research funders in the UK on *Good Practice Principles for Sharing Individual Participant Data from Publicly Funded Clinical Trials* (2015). We have led the debate and practice of transparency and reproducibility in prognosis research with editorials and guidance on this and on feasibility/pilot trials published in *PLOS Medicine*, *BMJ*, and *Annals of Internal Medicine*. Our CTIMPs all comply with the AllTrials call for complete registration and reporting.

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

4.1. COLLABORATIONS, NETWORKS, AND PARTNERSHIPS

4.1.1. Collaborations with academic colleagues in other institutions

Our academic collaborations are an integral part of our research and impact strategy and its successful delivery. These collaborations allow us to share methodological expertise, ensure innovation, and increase research impact. They extend beyond traditional primary care boundaries to include strong partnerships with world-leading specialists in targeted areas of methodology and secondary care research.

Cross-cutting academic collaborations

Two major academic collaborations operated across our research themes in 2014-2020 and, following successful renewal, will continue to sustain our research and impact strategy. Our membership of the **NIHR School for Primary Care Research** (2008-2019; renewed 2020-2025) has brought significant opportunities to collaborate with researchers from institutions across England to lead and contribute to world-leading research studies in primary care and innovative evidence synthesis addressing key challenges and uncertainties. These collaborations are particularly valuable for pooling interdisciplinary expertise, and for large, multicentre studies in cross-cutting topics (e.g., management of physical-mental comorbidity (NOTEPAD), stratifying antihypertensive treatments in people with multimorbidity (STRATIFY), cancer decision rules (CANDID), evidence synthesis on physician burnout, and mental health needs of patients with long-term conditions). The visibility and diversity of research that such collaborations afford, and the commitment to developing capacity and capability for early career researchers, helps attract and retain a diverse, multidisciplinary primary care research workforce at Keele. Under Mallen's Directorship the renewed School will place even greater emphasis on wider collaboration and capacity development. In leading the long-term condition's theme of the **NIHR West Midlands CLAHRC (ARC)** renewed in 2019-2024) we work closely with academic researchers from a wide range of disciplines at Warwick and Birmingham Universities. Our long-standing strategic collaboration with Birmingham University's Health Economics Research Unit (2008-) ensures high-quality health economic input in our research.

Theme-specific academic collaborations

In our **musculoskeletal research** theme, we have maintained long-term strategic collaborations with groups in Lund, Oslo, Odense, Rotterdam, Melbourne, and Sydney, underpinned by Visiting Professorship awards (Petersson/Englund, Grotle, Runhaar, Menz, Blyth). These collaborations:

- attract research income from domestic and overseas funders (USA: PCORI 2013-2015; Australia: NHMRC 2018-2022; Norwegian Research Council, 2020-2024)
- help extend our international reach (*Lancet* Commissions on low back pain (Foster, Croft (2018)) and osteoarthritis (Peat, Dziedzic (2020-))
- provide critical opportunities to reproduce and extend research findings and knowledge mobilisation across different settings (i.e., international comparisons of consultation rates (Jordan 2014); implementing Keele's StartBack intervention in the US healthcare system (Cherkin 2018); validating new outcome measures and subgrouping tools).

As the National Centre of Excellence for Primary Care Musculoskeletal Research, we have

strengthened links with other Versus Arthritis centres:

- joining as co-applicants in the successful renewal (2019-2024) of the MRC/Versus Arthritis Centre for Musculoskeletal Health and Work (CI: Walker-Bone (Southampton))
- In 2017, becoming a member of the UK Research in Musculoskeletal Epidemiology (UK-RiME) partnership (CI: Dixon (Manchester)), which provides training and mentoring of early career researchers and facilitates collaborative project and programme grant applications.
- Collaborating with researchers from the Versus Arthritis Pain Centre (CI: Walsh (Nottingham)) on new primary care trials and observational studies

Our **mental health** and **cardiovascular research** teams have longstanding and highly productive academic collaborations with academic and clinical colleagues across the UK, particularly at University of Manchester where our research leads in these themes, Chew-Graham and Mamas, hold Honorary Professorships. Our cardiovascular groups' expertise in the use of routine national audit and electronic health record data has attracted extensive collaborations in the United States and in Europe.

Our **prognosis research** team works closely with other world-leading methodology researchers in the UK (e.g. Collins - Oxford), Europe (Moons, Debray - Utrecht; Steyerberg - Rotterdam) and North America (Hayden - Nova Scotia). This collaboration supported by a prestigious MRC Partnership Grant and producing a highly-influential framework for prognosis research, has gone on to develop reporting guidelines, risk-of-bias tools, and a range of other methodological evidence and guidance. Collaborators contribute to our summer school and short courses in prognosis research methods, which attract students internationally, creating an excellent, sustainable training opportunity for staff and students at Keele. In turn, this drives applied research collaborations between our researchers and international groups, thus far resulting in new international studies pooling trial data for IPD meta-analyses in low back pain, osteoarthritis, and shoulder disorders, as well as visiting scholar placements for early career researchers. Having established this collaboration around our longstanding musculoskeletal research theme, we are now extending it to each of our other research themes.

Our emerging **Institute of Global Health** has already built strong collaborations to grow primary care research in Asia (Sri Lanka, Pakistan, Philippines, Malaysia, Singapore), Africa (Zambia, Ethiopia), and South America (Brazil).

Wider commitment to capacity and career development in primary care research

In addition to national training roles, our senior staff are experienced and approved **mentors** to clinical academics and methodologists in over 12 other UK HEIs, through schemes run by Society for Academic Primary Care/NIHR School for Primary Care Research, the Academy for Medical Sciences, UK-RiME, NIHR, UKRI, and Wellcome Trust. Each year we host 10-20 **research visits** from international HEIs, many of whom are early career researchers attracted by our reputation for primary care research and a culture of open collaboration.

4.1.2. Our local and regional NHS partnerships

Our strong partnerships with the NHS and social care reflect our commitment to research for patient benefit and the NIHR mission to make the NHS a world-leading environment to conduct research. Our outstanding academic-NHS partnership is formalised through the **Keele Primary Care Research Consortium**, producing a shared research strategy which maximises the impact and reach of our research. This unique partnership has Director-level representation from key stakeholders across the Staffordshire and Shropshire health economy including CCGs, Community Trusts, Public Health and the NIHR Clinical Research Network. The Board provides strategic oversight and direction, ensuring the most pressing health problems facing the region are represented. This approach also ensures rapid adoption, roll out and scaling up of innovation to improve health and wellbeing in this deprived region. Our partnerships include **Board and Director-level representation and joint appointments** with key local and regional stakeholders, ensuring research and innovation are prioritised and integrated into strategic and operational planning. These appointments include: Honorary Director of Research and Innovation, Midlands

Partnership Foundation Trust (Mallen); Clinical Chair, Stoke-on-Trent CCG (Clarson); North Staffordshire Alliance Board (Duffy); NIHR CRN West Midlands Primary Care Research lead (Helliwell). **Service Level Agreements** with Midlands Partnership Foundation Trust, responsible for adult social care in Staffordshire, have facilitated joint working. Our mental health research theme provides an exemplar of this close partnership. Improving mental health and wellbeing in the North Midlands is a key priority for our health and care partners. In 2016, Keele and South Staffordshire and Shropshire Healthcare NHS Foundation Trust (now MPFT) developed a joint mental health research strategy co-led by Professor Carolyn Chew-Graham, Professor Athula Sumathipala and Professor Saeed Farooq. It is the product of a multi-step consultation process, agreeing priority topics, recognising capacity building within an initial 'project based' approach, and with an emphasis on theory-driven novel approaches to treatment development. More broadly, through our partnerships we have provided evidence-based training to support new roles linked to local priorities and initiatives, including First Contact Practitioners and social prescribing.

These close partnerships have led to tangible benefits:

- Uptake of our STarT Back intervention by all community physiotherapy providers in the West Midlands supported by a coalition involving Versus Arthritis, Keele and West Midlands Academic Health Science Network (WMAHSN)
- Early adoption of physiotherapy direct/self-referral to physiotherapy - a precursor to the national First Contact Practitioner scheme
- Staffordshire STP deciding to act as a beacon site for NIHR Moving Forward evidence-based interventions, supported by a collaboration between Keele and the Chartered Society of Physiotherapy
- Developing evidence-informed strategies to meet the mental health needs of people living with persistent pain supported through the Q Lab–Health Foundation
- Some of the highest primary care accruals for West Midlands North CRN

Opportunities for **industry engagement and collaboration** have been significantly widened through the creation of the University's Business Gateway, launched in 2017, which provides regional forums with 150+ SMEs in the Healthcare and Medical Supply Chain. Through joint working between our Impact Accelerator Unit, WMAHSN, and Keele's Business Bridge we have shaped musculoskeletal calls for the Small Business Research Initiative, championed themes on self-care and preventative interventions and efficiencies in delivering care and hosted an EIT-Health Innovation by Ideas project, partnering Lloyds Pharmacy to implement our innovations into community pharmacies.

The strategic importance of these local and regional partnerships has been strongly endorsed by Keele University, with our launch of **Keele Deal | Health** in 2019, setting out ambitious plans to draw together academic expertise from across the entire Faculty of Medicine and Health Sciences to work with our regional partners across Staffordshire, Shropshire and Cheshire STPs, on a shared research and impact agenda addressing the key areas of workforce development, research and innovation, and evidence-based service transformation.

4.1.3. Beyond the local and regional health economy

Through academic consultant contracts, held with **Public Health England** since 2014, we have provided research evidence and expert advice that contributed to their musculoskeletal and healthy & productive ageing strategies. Our ongoing work provides evidence synthesis and original research on the uptake of recommended interventions and their potential effects on health inequalities; brief self-assessment of musculoskeletal health to inform possible new NHS Health Checks; developing methods and metrics using primary care databases to identify population musculoskeletal health indicators for the 'Fingertips' tool for commissioners.

We work closely with, and serve, a number of **charitable and professional organisations and societies** to strengthen the research base, and to develop evidence-informed guidance and information for practitioners, patients and the public. In 2014-2020 our staff have worked with Versus Arthritis, Age UK, PMRGCAUK, the National Rheumatoid Arthritis Society, the Royal Osteoporosis Society, the British Society for Rheumatology, the Chartered Society for

Physiotherapy, the Society for Academic Primary Care (Chair: Chew-Graham), and the Pain Society. Specific initiatives include leading the British Society for Rheumatology gout management guideline working group (Roddy), national Rheumatoid Arthritis Healthcare Quality Improvement Audit, evaluating First Contact Practitioner scheme, and producing national priorities for osteoporosis research (Paskins).

4.2. WIDER ACTIVITIES AND CONTRIBUTIONS TO THE RESEARCH BASE, ECONOMY AND SOCIETY

We actively encourage involvement with **NICE** as a means of accelerating the impact of research into national guidelines. In 2014-2020 we supported three NICE Fellows (Dziedzic, Sowden, Salt), topic advisors and members of Guideline Development Groups in gout (Roddy), low back pain (Somerville), multimorbidity (Chew-Graham), depression (Chew Graham), and osteoarthritis (Cottrell, Quicke, Parry), as well as expert clinical input to NICE Technology Appraisals on new gout drugs (Roddy). We are represented on NICE Quality Standards Groups (Chew-Graham, Walsh). Dziedzic acts as an adviser to the NICE Fellows and Scholars Programme on implementation.

Members of our Impact Accelerator Unit hold key national roles, including: National Implementation Lead for Musculoskeletal Physiotherapy for NIHR Dissemination, leadership of the NHSE Midlands Musculoskeletal Network (Dziedzic); Versus Arthritis Clinical Champion (Stevenson). We initiated the West Midlands NIHR CLAHRC Knowledge Mobilisation Research Forum and contribute to the Nation Forum, the NIHR Knowledge Mobilisation Alliance. We facilitated a workshop for the launch of the NIHR Themed Review on Musculoskeletal Physiotherapy for 90 stakeholders from a range of professional backgrounds and helped the NIHR gain an understanding of Knowledge Mobilisation for a report for the NIHR Strategy Board (July 2018) describing enhanced dissemination activity.

Our team hold senior positions within the **NIHR and other research funding panels**, helping sustain and improve processes of competitive research funding national and regionally, and providing a strong primary care voice.

- Hay is Director of Programme Grants for Applied Research (PGfAR) and member of the NIHR Strategy Board, working to diversify the scope of programme funding to better serve primary care research.
- Mallen led capacity building in the NIHR School for Primary Care Research, chairs the NIHR Primary Care Incubator, and sits on the Research Capacity Development Board and Integrated Academic Training panel, stimulating and growing primary care research capacity.
- Foster chairs the HEE/NIHR Integrated Clinical Academic Doctoral Research Fellowship scheme, the NIHR West Midlands Research for Patient Benefit scheme; and is lead NIHR Training Advocate in Physiotherapy, influencing development of allied health professionals in primary care research.

In addition, we encourage and support our staff to contribute to national and regional prioritisation and award panels for the NIHR (HTA: Roddy, Cottrell, Foster, Mallen; PGfAR: Peat, Jordan, Jinks; Research for Patient Benefit: Muller, Peat, Bishop; HS&DR: Kadam), and charitable organisations (Versus Arthritis: van der Windt, Protheroe; Royal Osteoporosis Society: Paskins). Many of our staff hold editorial roles with leading journals in our field (e.g. Riley is statistics editor for BMJ; Chew-Graham is editor of Health Expectations; Dunn Epidemiology editor for Eur J Pain; Mamas associate editor for Circulation; Van der Windt contact editor for Cochrane Diagnostic test Accuracy Reviews; Peat associate editor for Arthritis Care and Research).

We have formed enduring and productive close partnerships and working relationships across the local and regional health economy linked to our research strengths and which underpin a strong and vibrant research culture serving long-term health needs of patients and populations, many of whom live in urban-deprived and rural settings. This model, sustained and evolving for over two decades, has received national and international recognition. The recently launched Keele Deal | Health initiative signals Keele's commitment to further advance these partnerships.