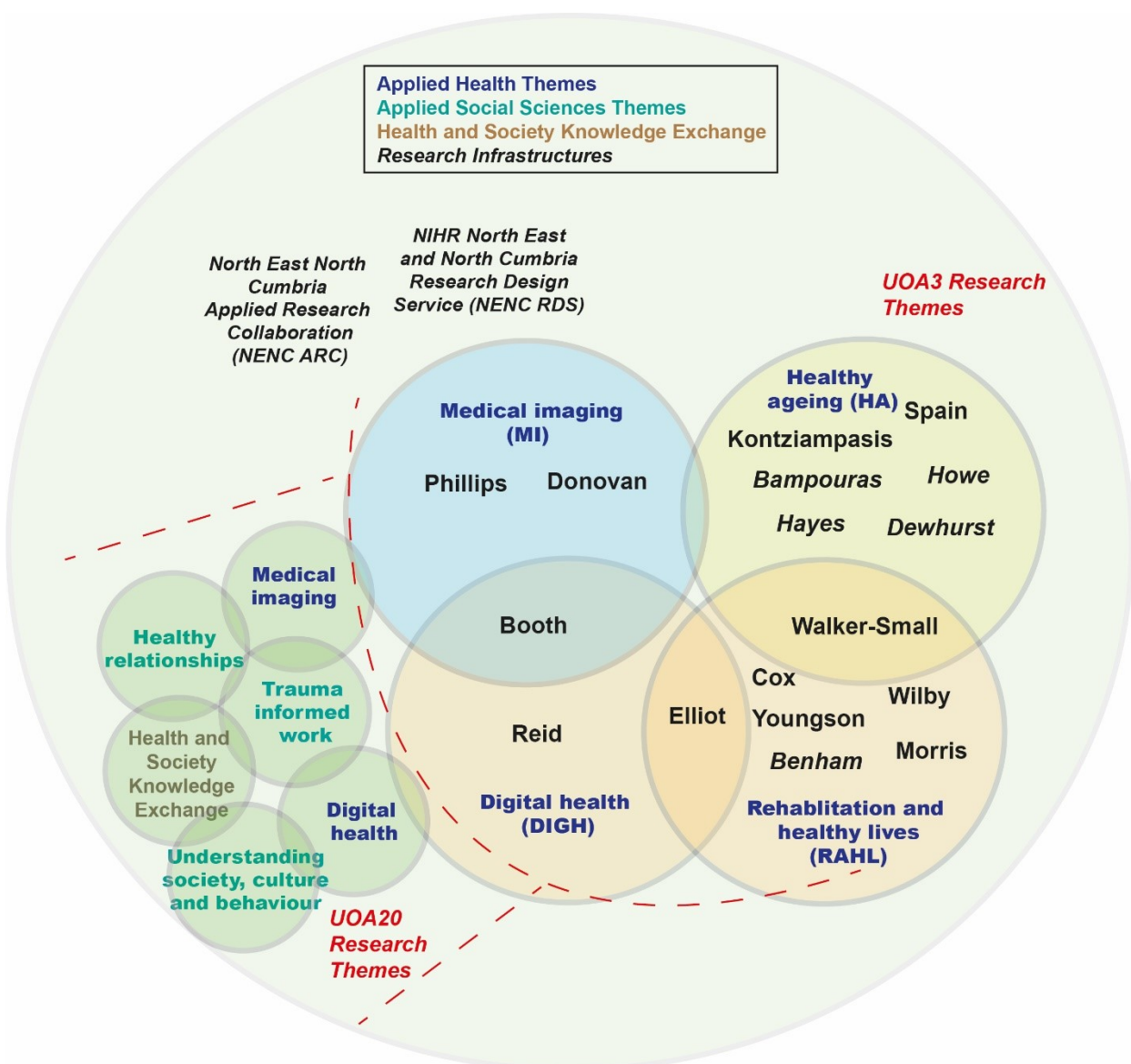


Institution: University of Cumbria (UoC)
Unit of Assessment: UOA3: Allied Health Professions, Dentistry, Nursing and Pharmacy
<p><u>1. Unit context and structure, research and impact strategy</u></p> <p>1.1 How is Research Structured across the UOA</p> <p><u>1.1.1 Context</u></p> <p>This unit undertakes research that focuses on major health challenges faced by our society. Our researchers investigate diagnostic and therapeutic interventions across several allied health professions, consequent implications for health and social care, healthy ageing, and improving effective patient communication in support of wellbeing.</p> <p>Building on a strong track record, the unit reflects the university's long association with health and social care professions since the formation of St Martin's College, Lancaster in 1964, from which the University of Cumbria (UoC) later developed. Latterly, this has been supported by the institution's submission to REF2014, which included:</p> <ul style="list-style-type: none"> • Allied Health Professions (3FTE) - 49% assessed at 3* and above, and 94% at 2* and above. • Sport and Exercise Sciences (6FTE) - 22% submission being 3* and above, and 14% at 4*. <p>This platform has enabled UoC to grow research into related areas, and for REF2021, UoC will be submitting over three times as many staff in health-related UOAs, compared to REF2014 (across UOA3 and UOA20). The REF2021 submission for UOA3 now includes sport science staff previously submitted to UOA24 and in total includes 17 staff and 11.1 FTE.</p> <p>Researchers named in bold are Category A staff with 'significant responsibility for research' (SRR, see UoC REF2021 Code of Practice, 2.10) and those in bold and <i>italics</i> are individuals who left UoC during the REF assessment period. Individuals in plain are non-submitted UoC staff – including staff with 'emerging responsibility for research' (ERR, see UoC REF2021 Code of Practice, 2.12), Research Assistants (RA), Postgraduate Researchers (PGRs) and honorary/retired staff. Names followed by a number (e.g. Donovan1) cross reference to REF2 outputs.</p> <p><u>1.1.2 Strategic achievements enhancing research culture and environment</u></p> <p>Since REF2014, and against the five year strategic objectives outlined in the 2014 UOA3 Environment Statement, two principal achievements include the formation of the:</p> <ul style="list-style-type: none"> • 'Institute of Health' in 2018 (IoH) - uniting all of UoCs health and social care programmes and encompassing nursing, social work/care, midwifery, sports science, psychology, medical sciences, and paramedic. • 'Centre for Research in Health and Society' in 2019 (CRiHS) - bringing together research excellence, experience, and resource to improve the vitality (through critical mass of researchers, and coherence of research expertise) and sustainability (through coordination of researcher development) of the research environment and culture. The Centre Director and Theme Leads additionally ensure quality assurance, research integrity, and effective communication across research active staff in the IoH to increase high quality academic outputs, research income and impact (REF5a, 1).

CRiHS' vision is the: *"Positive transformation of health and social outcomes for all through applied scholarship, research and knowledge exchange, leading to excellence in health and social care practice locally, nationally and internationally."*

- **Applied Health Research**, digital health, medical imaging, healthy ageing, rehabilitation and healthy lives.
- **Applied Social Science Research** – healthy relationships, trauma informed work, understanding society, culture and behaviour, communities (UOA20).
- **Health and Society Knowledge Exchange (HASKE)** - a dedicated unit leading research and evaluation commissions, bidding and tendering, and workforce development (the HASKE Co-Leads are submitted to UOA20, but provide support to UOA3 staff).

Fig 1. demonstrates the CRiHS research themes returned to REF2021 (across UOA3 with UOA20 for comparison), and the focus of this unit's Category A/SRR staff. See Section 1.3 for aims and objectives to grow research excellence across each of CRiHS' themes. Staff in Medical Imaging (MI) and Digital Health (DIGH) are also being returned to UOA20.



Research themes submitted in this unit include:

- **Healthy ageing (HA)** - conducting applied research to understand the nature of ageing and to promote practices and service design to ensure ageing is healthy and enjoyable, including injury prevention. It includes biomedical research, particularly in relation to cardiac research and structural biology.
- **Medical Imaging (MI)** – researching sonography, radiography, and ultrasound. Research in social issues in medical imaging is returned in UOA20. Research in this theme is concerned with issues of image perception and visual search as well as fetal eye movements.
- **Rehabilitation and Healthy Lives (RAHL)** – research on occupational therapy, sport and physiotherapy, including education, practice development and placements, as well as work in forensic settings (prisons and secure units).
- **Digital Health (DIGH)** - concerned with digital applications, tech solutions, independence and empowerment. Emerging from the Cumbrian Centre for Health Technologies (2014-2018, REF5a, 2.1). The theme works collaboratively with industry and practice on technology adoption and new services.

This unit is supported by additional structures (Section 3 provides further details) including:

- **Health and Society Knowledge Exchange**, emerging in 2019 from the Health and Social Care Evaluation Unit (2016-2018). Enhances research culture by enabling a number of staff to gain skills and experience in supporting, bidding for and delivering externally funded research projects.
- The **North East North Cumbria Applied Research Collaboration** (NENC ARC) and the National Institute for Health Research (NIHR) **North East and North Cumbria Research Design Service** (NENC RDS); supporting staff to design and seek external funding for research, and to access regionally distributed funding.

1.1.4 CRiHS Contribution to Research Culture and Environment

The establishment of CRiHS marks a turning point for Institute of Health (IoH) and a step change in research capability and capacity. CRiHS provides a centralised, resource for all research active staff in the) creating:

- A single PGR community (10 UOA3, 24 UOA20) that facilitates extended opportunities for internal/external networking, promotes sharing of skills and training opportunities, and signals to a research 'culture' that supports future researchers for sustainability of the discipline.
- Recognition to areas of research excellence, empowering academics to pursue research projects under the auspices of CRiHS and to do so in a collaborative and supportive environment.
- Additional capacity through coordination and leadership, and capability through sharing of knowledge, skills and experience.
- A focal point for internal research activity through public lectures, seminar series, Work in Progress seminars for new and established researchers, thematic discussions, research and development training sessions and hubs for PhD students.

1.2 Performance against REF2014 Objectives and Objectives 2021-2028

This unit has made significant progress against the REF2014 strategic objectives, reviewed below.

- **Supervisory capacity has increased through staff recruitment and development** – this has enabled extension of the programme within sport, exercise science, physiotherapy and biomedicine. Four additional research active staff have been recruited. Two submitted staff and two staff with 'emerging responsibility for research' (ERR) have achieved PhD's (Section 2).
- **Enhanced stakeholder engagement has generated new research and impacts** – enabled through close working with major NHS Trust partners (Impact0301 and Impact0302) and the newly established NENC ARC and NENC RDS. The UOA has the support of a PVC (Health, Environment and Innovation) who is Chair of Council of Deans for Health (Webster-Henderson). Researchers are actively involved in various stakeholder networks, particularly both Academic Health Science Networks (AHSNs) for North West Coast (NWC) (**Reid** and Sapsford), and for North East - North Cumbria (NENC).
- **Externally funded research has increased across the two health UOAs** – this unit has returned **£357,815** of HESA-returned research income across the assessment period (£550,000 in REF2014). However, when including CRiHS researchers in UOA20 (a new UOA for REF2021), over £1.5m of research income has been generated across the CRiHS research themes.
- **Collaborative relationships and partnerships have increased** - Staff within this unit have developed national and international collaborations with a number of other higher education institutions. This has led to a 52% increase in research publications across the assessment period for staff aligned to UOA3. £36,631 has been invested in unit staff through the internal research fund.
- **Support for PGR students has been improved** – this has focused on increasing PGR support in health domains (across UOA3 and UOA20) with 13 PGR completions across the assessment period. 34 PGRs are currently aligned to the Institute of Health.
- **Funding has been used to support PGR development** – this includes two QR funded studentships in this unit (Hampson, Yasar) to complement an externally funded studentship (Thomas, Eleanor Peel Trust), supporting PGRs to develop academic careers.
- **Focussed growth in Occupational Therapy (OT)** - OT has long been a teaching strength and, since 2014, development of a complementary research activity has been strategically supported. The work of **Morris, Cox, Youngson and Wilby** is now externally recognised and three staff with emerging responsibility for research have been supported to complete PhDs. There are four occupational therapists currently completing their PhDs within the Occupational Therapy Hub of researchers. In addition to staff PhDs, since 2014, five OT's have completed part-time PhDs.

1.3 Research Strategy 2021-2028

CRiHS has the following strategic aims between 2019-2024:

- To embed a culture of high quality scholarship and research
- To increase research capability and quality for students, staff, partners
- To seek, develop and maintain meaningful engagement and collaborations with internal and external partnerships
- To develop a strong and positive CRiHS brand and reputation internally and externally
- To increase health and society research and enterprise income
- To maintain a dialogical relationship between research activities and operating environment.

These provide the basis for the research within UOA3 to be strengthened. In particular, we will seek to maintain research leadership across all the unit themes, supporting colleagues with emerging research responsibilities.

Specifically, we plan to strengthen work around other professions, particularly nursing and physiotherapy, where there are opportunities to engage with external stakeholders. UoC hosts a nationally significant Centre for Paramedic Practice, providing undergraduate and postgraduate education for all but one of the UK's Ambulance Services. Through links with the NIHR ARC programme, research interests will be developed with key staff.

1.4 Enabling Impact

Underpinned by UoC's strategic intent to "*contribute to the social, cultural and economic well-being and prosperity of our communities*", this unit ensures that impact is integral to research activity. The CRiHS Director (Stuart [UOA20]) provides impact training sessions. UKRI/Research England guidelines and REF Impact Case Study templates are used to help staff understand and articulate research impact beyond academia. The Director, Theme Leads, and members of the Professoriate provide one-to-one research mentoring. The Research and Knowledge Exchange Office (RKEO) also support stakeholder engagement for impact generation. (REF5a, 4).

Unit staff are supported to consider the impact of their research through guidance, mentoring and targeted use of the Internal Research Fund (supported via QR funding). Within this UOA, examples include funding for: **Morris** to disseminate a new occupational engagement tool (2016) and engage with users (Impact0302); **Donovan** to attend European Conference of European Conference of Eye Movements (2017) and discuss the impact of his research findings with stakeholders (Impact0301); and **Booth** for engagement with the Society and College of Radiographers, leading to changes in clinical practice guideline documents on caring for patients with dementia (reserve ICS).

1.5 Supporting Interdisciplinary Research

Achieving research outcomes and impact demands interdisciplinary working, and CRiHS structures enable this through regular cross-institution research events (seminars and presentations) and other forms of engagement and staff interactions. This promotes collaboration with other active researchers from diverse fields. Evidence of success in this area include:

- **MI** – where innovative cross-disciplinary studies have been undertaken drawing on expertise in social psychology to enhance the understanding of clinical practice in medical imaging.
- **RAHL** – researchers have engaged with social science researchers on occupational therapy within secure settings, and in relation to specific health challenges including chronic fatigue, and muscular skeletal disorders.
- **HA** – researchers have worked collaboratively with psychology staff on psychological-emotional experience data for marathon running and on rapid weight loss practices in combative sports. This unit's outputs for **Kontziampasis** demonstrate significant interdisciplinarity across engineering, biomedical and physics disciplines.
- **DIGH** – researchers have combined health techniques with digital innovations and industrial uses. **Reid** undertook research with Bidmead and Marshall (UOA20) on workforce attitudes and perceptions of video-conferencing for remote diagnosis of dysphagia. This study has contributed also to an ICS submitted in UOA20.

Seven staff within this UOA supervise PhDs with colleagues being submitted in different UOAs. CRiHS proactively facilitates interdisciplinary research through its series of seven 'cross-cutting' themes with leads outside the IoH.

1.6 Supporting an Open Access Environment

IoH and unit Staff are encouraged to submit research into peer reviewed journals that have at least some level of open access, and CRiHS leadership and thematic groups support and enable this. Within this unit in particular, and in the context of the very applied and practitioner based nature of the work, this is even more important. Colleagues within RKEO and those working within the institutional repository support staff with decisions about journals to ensure open access options. CRiHS hosted six open access seminars (2018-2020) with audiences of between 10 and 50 per seminar.

Unit staff also disseminate their work widely through public lectures and events and through the media, which leads to increased engagement with the research. Full details are provided in Section 4, with examples below including:

- **HA - Bampouras** has given several public outreach talks to various branches of the University of the Third Age, Age UK, and an event entitled Active Ageing around the Bay. **Hayes'** study of exercise training improving free testosterone in lifelong sedentary men was used in an article in the New York Times. **Spain's** work contribution to an MRC funded project ('Noisy Knees') examined a new way of diagnosing and assessing knee osteoarthritis, receiving coverage in The I, The Engineer and Orthopaedic News.
- **MI - Donovan's** work examining the visual perception of babies in the womb at the ultrasound laboratory in Lancaster and at Blackpool Victoria Hospital featured in Discovery Magazine's list of 100 discoveries in 2019, and was widely publicised locally.

1.7 Supporting Research Integrity

Two members of this unit have specialist expertise in ethics. **Cox** has been a member of the Ethics Board for three EU Horizon 2020 programmes. **Booth** was Chair of the NHS Research Ethics Committee 12 (North West – Lancaster) from 2006-2017. She leads on teaching research ethics to PGRs as provides guidance and mentoring to both PGRS and staff applying to the NHS Research Ethics Committee.

Ethics compliance at UoC is centrally managed through the Research and Knowledge Exchange Office (REF5a, 3.1). **Cox**, as Director of Research, chairs the University Ethics Committee and **Booth** advised on the design of processes. Within UOA3, the majority of research programmes additionally go through NHS ethical procedures.

The CRiHS structure and theme leads ensure research integrity and adherence to the Concordat, through CRiHS training workshops (for example, sessions on writing good research proposals), interdisciplinary Work in Progress seminars and providing a 'critical friend' role to researchers developing their projects. CRiHS thematic discussion groups enable research integrity to be discussed openly.

In addition to the support provided by CRiHS, UoC provides a centrally delivered 'Research Skills Development Programme', and 'Summer School', open to PGRs as well as staff. This includes sessions delivered by eight UOA3 staff, including induction, thesis construction, ethics, mixed methods, PhD transfer and mixed media arts. Five unit staff have been involved in supervisor training.

2. People

2.1 Staffing Strategy and Staff Development

People are at the centre of our planning and goal setting. There has been a steady increase in staff involvement in research, made possible and nurtured by strategic actions. Within this unit, many staff are drawn from careers in clinical practice, moving into teaching in mid-career, often from senior clinical or management positions. Supporting them to develop critical research skills requires a varied approach, with flexibility to enable each person to identify their own path.

CRiHS is a vehicle for leadership and advocacy of research. The approach is supportive and facilitative, with regular communications. A monthly newsletter shares opportunities for grant bidding or collaboration. Staff are encouraged to attend webinars and to seek advice/mentorship. Management time has been underwritten by the university, to provide time for the director (Stuart, 1FTE) and theme leads (Miller, Grimwood – 0.2FTE, all UOA20). The unit's overall staff recruitment and development strategy is outlined below.

2.1.1. Strategically recruit staff with research and impact experience to enhance CRiHS themes

There is a successful recruitment strategy to broaden research and support impact across the themes. In **HA, Spain** was recruited as Lecturer in 2018, joining from Lancaster University (as a post-doctoral researcher); and **Kontziampasis** to Lecturer in 2019 from the University of Sheffield (as Teaching Associate), becoming Senior Lecturer and Programme Lead for Engineering in 2020. **Hayes** was recruited in 2015 from London Met as Lecturer (becoming Senior Lecturer 2018) and **Howe** in 2017 as Lecturer. In **RAHL, Benham** was recruited as Lecturer in 2017, becoming Senior Lecturer and Professional Lead for Physiotherapy in 2018.

These appointments targeted key research within this unit, reflected in the themes of CRiHS. New emphasis on research has increased applications to advertised posts. Some key appointments of research active staff have recently been made in physiotherapy and sports science (Smith, Armstrong, employed after census date).

2.1.2. Support and enable staff progression

Of our Category A staff, all but one are on permanent contracts. Nine unit staff have been retained across the assessment period, evidencing continuity and staff development, and four unit staff were recruited with PhDs and research experience. For many staff, the first step on their research journey is to register and complete a PhD, and as of 31 July 2020, 6 non-submitted staff in UOA3 are registered PGRs.

Research activities are embedded within the staff progression system, with a bi-annual round for application for professorial and associate professorial titles. **Donovan** became Associate Professor in 2014 and **Bampouras** Associate Professor in 2017. **Morris** became a Principal Lecturer in 2017.

Dewhurst left UoC in 2017 to become a Senior Scientific Officer at the Ministry of Defence, and has subsequently progressed to Principal Academic (Exercise Physiology and Deputy Head of Department) at Bournemouth University. **Bampouras** left the University in 2018 to become a Lecturer in Biomechanics at Lancaster University, but remains a UoC Visiting Research Fellow.

2.1.3. Offer researcher development programmes to support staff in their research careers.

CRiHS ensures that early and mid-career researchers and postdocs are integrated into the research culture. This is enabled through wider development work (e.g., doctoral summer schools, development workshops), and in interdisciplinary research. CRiHS 'Work in Progress' seminars, theme discussions, tender workshops and guest lectures, support staff to develop research ideas. Staff are also supported with academic writing retreats (facilitated by the Professoriate), student socials and PGR led writing events (e.g., weekly "shut up and write sessions").

As evidence of staff development, in **RAHL, Morris**, since achieving PhD in 2012, has progressed to a senior leader within UoC, with five current PhD students, and authoring an Impact Case Study for this unit. **Youngson** was a PGR bursary student, achieving PhD in 2017 and joining the staff team shortly after. She is now lead supervisor for one PGRs and on two other supervisory teams. **Benham** was a cohort of the 2019 Future Leaders Leadership Development Programme. Overall, this unit has invested £46,971 in sabbatical leave, enabling staff to undertake research projects and/or complete PhDs (REF5a, 3.1).

Category A unit staff have full representation on the University's Research and Knowledge Exchange Committee (REF5a, 1). Staff from 2014 have been retained and developed (**Cox, Donovan, Phillips**), whilst the much-enlarged FTE in the submission evidences the unit's increasing vitality of research outcomes and impact. The establishment of more formalised structures, such as CRiHS will embed this further. Technical staff work within our laboratory facilities, discussed in more detail in Section 3.

2.1.4. Utilise and promote HR processes to encourage all staff to engage in research.

All staff within IoH now write Research and Scholarly Activity plans (RASA) with their line managers. These are collated by the CRiHS Executive Team, enabling staff development activities to be effectively planned and research opportunities to be targeted. CRiHS structures utilise the Performance and Professional Development Review (PPDR) process (REF5a, 3.1) to support staff to progress in their careers.

Staff are encouraged to sign up to research mentorship, organised centrally via RKEO. Mentoring, in addition to the CRiHS structures, also supports adherence to the Concordat principles. UoC achieved the HR Excellence in Research Award in 2016 (with **Cox** serving on the steering group), and the award was retained in 2020. **Donovan, Morris, Cox, Reid, Wilby, Bampouras** are (or have served as) research mentors (for central support see REF5a, 3.1).

Cox and **Donovan** support and mentor staff applying for research funding, publishing, or new to PhD supervision. **Cox** became UoC's Director of Research in 2014 and therefore supports unit staff to engage in research programmes. The unit will support a number of researchers with emerging responsibility for research across the next assessment cycle, including Sapsford, Wilson, Pemberton, Nelson and Bolton. In Radiography, **Booth** has already begun to support Bolton to publish research (*Radiography and Ultrasound*).

2.1.5. Utilise a network of visiting and honorary staff, and Professors of Practice to embed work with industry.

UOA3 utilises a network of Research Fellows, Honorary Professors, Researchers and Professors of Practice to facilitate academic and business exchanges:

- Glynn Shentall, Visiting Professor Radiotherapy Physics, (public lectures)
- George Krasopoulos, Visiting Professor of Cardiac Surgery (public lectures)
- Leon Jonker, Visiting Research Fellow (research methods)
- Prof Shirley Reveley, Emeritus Professor (co-publishing of outputs)
- Dr Andrew Turnell, Professor of Practice (public lectures)
- Associate Professor Joanne HUDSON, Visiting Fellow (research conference contribution)

CRiHS and the IoH have created a more sustainable research community with formalised structures increasing capacity and extending capability. CRiHS events, including visiting lectures, workshops, and staff presentations, are open to level 6 and level 7 students, in addition to staff.

2.2 Research Students

The unit provides opportunities for high quality training and supervision, with a pipeline of active and integrated researchers fully encouraged to engage within the research and practice community. PGR development happens through support from supervisors, access to Graduate School opportunities, and engagement with CRiHS (e.g. regular CRiHS PGR coffee meetings).

An important policy has been to use external funding for PGRs, supplemented by use of QR funding to support the development of the research themes in UOA3.

- In **HA**, a group of PGRs investigated factors on fall risk of older adults. A QR-funded studentship (Yasar) was provided to **Hayes** to complement studentship funding from the Eleanor Peel Trust (Thomas) (Section 3), and research assistant post (Smallwood). Yasar completed his PhD on sprint training for older adults in 2020 under the supervision of **Hayes** and **Dewhurst**, leading to publications and an international conference presentation. QR funding also provided a fees only studentship to Ejuoneaste (**Bampouras** as supervisor) to explore narratives of historically physically active women of 60+ years following total hip replacement surgery for osteoarthritis. This has led to a systematic review registration with PROSPERO. See **Bampouras1&2** for evidence of publishing with PGRs (Thomas lead author on both papers).
- In **RAHL**, **Cox** has supervised three of this unit's staff to completion (**Morris**, **Youngson** and **Wilby**) as further evidence of successful supervision. Successfully completed PhD students (non-staff) are now in roles at the Yorkshire Fatigue Clinic (Therapy Director) and at Lancashire Teaching Hospitals NHS Foundation Trust (Consulting Specialist).
- In **MI**, **Donovan** has supervised one of this unit's staff to completion (Sapsford). In addition, he supervised Thomas, who is now employed as a Research Fellow in Biomechanics and Brain & Behaviour at Liverpool John Moores University.

Across the unit, PGRs have been supported by supervisors to publish widely and to present on an international scale (e.g. *British Journal of School Nursing*, *Journal of Social Sciences and Humanities*). CRiHS recently launched a regular webinar programme, delivered by invited guest speakers, featuring research on health professions pedagogy, cancer care nursing, public health, health inequalities, and mental health.

The unit provides all PGRs with opportunities to contribute to the vitality of the unit.

Unit staff utilise their networks and collaborations to facilitate a research environment and culture that is conducive to a healthy and stimulating research environment. Across the **HA** and **MI** theme, this has included a number of events. For example, the Active Ageing Symposium, held consecutively for four years (**Donovan**, **Dewhurst** and **Bampouras** as organisers), attracted international speakers and national delegates (average 40 per year), including PGRs and practitioners in healthy ageing and medical imaging. The 2017 event was held in collaboration with the University of Rome Foro Italico with guest speakers including Visiting Research Fellow Hudson and Professor Andrea Macaluso, from the Foro Italico. Macaluso was Visiting Professor and delivered a series of talks. The 2019 event was organised jointly with Lancaster University's Centre for Ageing with contributions from academics and practitioners (including Visiting Fellow, Askapan).

PGRs in this theme have been supported to present research at European College of Sport Sciences Annual Congress and to co-author in journals including *Human Movement Science*, *the Journal of Electromyography and Kinesiology*, *Experimental Brain Research* and *MDPI Sports*. Smallwood was awarded the Dale Scholar Grant from Simpson University, US, to enable her to study in the UK.

In **RAHL**, close alignment with professional institutes has been effective. For example, Perryman-Fox, supervised by **Cox** and **Morris** was selected to be a visiting scholar at the University of Wisconsin and has received the Elizabeth Casson Trust Award for two consecutive years (2018, 2019). The award is intended for UK occupational therapists to reorient their careers and lift themselves to a higher professional level. This has enabled researchers in this theme to engage with a wide international network, with Perryman-Fox regularly contributing to related seminars and research events for other researchers and staff in this field.

CRiHS offers an opportunity for PGR annual reviews where research in progress is presented – now formalised as part of the end of year review process. All candidates are invited and supported to present their research at Research Summer School. The approach to PGR recruitment has contributed to developing the academic expertise and reputation of supervisors. A high-level commentary on Equality, Diversity and Inclusion data for this unit's PGRs has been provided below.

Table 1. EDI Data for UOA3 PGRs

Key consideration	Unit Considerations/Actions
55% under the age of 39.	Important to maintain skills training and opportunities for younger researchers whilst integrating the experiences of older PGRs.
73% female and 27% male	Higher proportion of PGRs are female, compared to staff pool (Table 2), all supervisors have completed unconscious bias training (UBT)
18% BAME	Positive figure in relation to staff pool, all supervisors have completed UBT.
36% declared disability	Unit staff made aware of institutional structures to support health and wellbeing, including signposting to Disability Officers.
9% LGB	Reflective of staff pool, encouragement of PGRs to engage in institutional networks.
63% part-time	Ensure that part-time PGRs engage with unit activities, and if in practice, their experiences contribute to unit vitality.

2.3 Equality, Diversity and Inclusion (EDI)

Within our research portfolio, a number of staff specifically work on the health of excluded groups. For example, **Morris** and **Cox** have researched men living in secure mental health units. **Morris** has also served as Research and Development Lead for Mental Health as part of a specialist section of the Royal College of Occupational Therapists (RCOT) from 2013-19. **Youngson** has provided professional supervision for Occupational Therapists at Growing Well – a mental health charity and organic fruit & veg farm and training centre in Kendal. This unit aspires to transfer the learning into our culture to ensure that all staff are given the support required for them to develop.

Analysis of EDI data for Unit staff is presented in Table 2. below and includes commentary on how this relates to output selection. Throughout preparation of our submission, Equality Impact Assessments (see REF Code of Practice, 1.8 for schedule) have been analysed to inform this process. Table 2 indicates a number of areas where actions need to be focused, but overall is considered representative of the institution, the health sector and the geographic context. This data has been presented to the CRiHS Management Team, within the Institute of Health Senior Leadership Team, the Deputy Vice-Chancellor (Health, Environment and Innovation) and Head of HR to inform action and strategy. The strategy for improvement over the future period will include:

- Workshops on EDI led by CRIHS Director Stuart (UOA20), Professor of Social and Health Inequalities and a leading expert in empowerment and agency;
- Regular reviews of staff data to identify areas of imbalance, with agreed positive actions as required;
- Targeted provision of individual support and mentoring.

Table 2. EDI Data for Unit Staffing and Output Selection (PNTS: Prefer not to say)

Category	%	Considerations	Proposed Actions
Age			
<= 39	31	A high proportion of staff have clinical careers before joining academia. Output pool has higher proportion of >60s.	Development of a strategy to engage staff earlier in their careers in researcher development.
40-49	31		
50-59	25		
>=60	13		
Gender			
Female	56	Representationally more balanced than NHS workforce (75% female). Output pool has higher male's representation (61%).	Ensure support available for all staff in the IoH to engage in research activities.
Male	44		
Orientation			
LGBT+	13	Reflective of institutional percentage. Output pool has 7% LGB representation.	Promote institutional EDI initiatives. CRIHS Director to deliver specific EDI sessions as part of skills and training.
HET	81		
PNTS	6		
Religion			
Religious	25	No conclusions.	Cross-reference with institutional developments and existing network, and consider promoting more widely.
Non-Religious	75		
PNTS	0		
Ethnicity			
White	100	No BAME representation. 5% colleagues are BME institutionally.	Consider positive action statement as area of under representation. Acknowledge that this will take time. Noted as a priority for CRIHS Director and IoH Leadership.
BAME	0		
Other	0		
Disability			
Declared	19	Representative of institution. Output pool reflects proportions.	Positive figures, demonstrating that staff are made aware of support and are able to research productively.
No Declaration	81		
PNTS	0		
Contract			
Full Time (FT)	81	Potentially hard to be research active on part time contract. 11% of outputs attributable to part time staff.	Ensure all members of staff complete a research plan, approved by their line manager; empowering PT staff to utilise research leave
Part Time (PT)	19		

3. Income, infrastructure and facilities**3.1 Research income and strategy**

This UOA has returned research income of **£357,815** to HESA. The strategy for generating research income encourages cross-leverage of funding sources.

- **HA** secured a Major Medical Research Grant from the Dowager Countess Eleanor Peel Trust. **Donovan, Bampouras** and **Dewhurst** launched the 'Gaze and Gait' project, which was successfully delivered across four years, and included an annual international active ageing conference with University of Rome Foro Italico and a PhD studentship. **Spain** has facilitated collaborative working with Lancaster University on an MRC funded study (Noisy Knees), which has supported publication of **Spain1** in *PlosOne*.
- **MI** has focussed on collaborative work with higher education and health partners. This includes Lancaster and Oxford University's, building on previous experience and expertise in eye tracking and digital imaging, and through the Health Education England-funded 'Ultrasound Academy' (Section 3.4) which included investment in evaluation and research. **Booth** also collaborated with Miller (UOA20) to extend the portfolio of externally funded research, with funding from the College of Radiographers Industry Partnership Scheme, and NHS Trusts.
- **DIGH** has utilised staff expertise in sociotechnical and clinical domains to deliver a number of specific commissions for health bodies, often working with partners and technology adopters in healthcare settings. For example, **Reid** participated in a project funded by Academic Health Science Network to explore video-consultations in nursing homes. Staff with emerging responsibility for research have also been engaged in these programmes (Sapsford). Income in this theme was returned in UOA20 (£249,883).
- **RAHL** has focussed on a number of smaller funded programmes to provide staff with opportunities to gain experience on externally funded programmes such as **Youngson** working with the Rosemere Cancer Foundation and a continued focus on forensic settings – including a Research Assistant externally funded to explore autism in the context of the criminal justice system.

Table 3. UOA3 HESA Research Income

Eleanor Peel Trust:	£134,713	Gaze and Gait in Elderly
CRH Charitable Trust:	£70,000	Autism Research Assistant
National Institute for Health Research	£46,364	North East and North Cumbria Applied Research Collaborations (NENC ARC), including a PhD studentship.
Health Education North West	£31,873	MSc: Ultrasound Direct Entry Support Evaluation Project
ESRC and Leverhulme Trust	£25,873	Human Fetus Study with Lancaster University
Health Innovation and Education Cluster	£25,723	End of Life Evaluation Project
National Institute for Health Research	£8,241	Improving quality of life and health outcomes of patients with psychosis with St Mary's University.
National Institute for Health Research	£5,440	CT colonoscopy project with UCL and Oxford University
Employability Skills in OT Students	£4,915	Higher Education Academy Occupational Therapy Skills
Rosemere Cancer Foundation:	£4,672	The Creation of a Breast Cancer Survivorship Programme

Since 2018, this unit has also utilised new infrastructures to support income generation – the **NIHR North East and North Cumbria Research Design Service (NENC RDS, 2018-2023)** and **North East North Cumbria Applied Research Collaboration (NENC ARC, 2019-2024)**. Both of these initiatives have generated income (up to July 2020) to this unit of:

- £46,364 (**NENC ARC**), including a PhD studentship (2019-2022), returned to HESA as research income.
- £7,678 (**NENC RDS**) returned as enterprise income.

This unit's future strategy for generating research income will:

- Utilise the **NENC RDS** to support staff to secure research income and **NENC ARC** to create new opportunities for staff to engage in externally funded research (this has started to be achieved, with £173,000 awarded in October 2020).
- Continue to build on success across the submitted themes, to involve an increasing number of staff in delivery of commissioned research to enhance capability. Utilise our internal experience to improve tendering and widen skills base.

This unit will grow and expand research capability and income by maximising income streams from CPD and apprenticeships. This includes c£380,000 from Health Education England for Paramedic Degree Apprenticeships and development of the Centre for Excellence in Paramedic Practice. Funding provides for focussed development of research capability linked to the profession. Similar developments in nursing may also support this unit to undertake research in this area.

3.2 Other unit income and infrastructure for researcher development

The **RDS NENC** and **NENC ARC** also provide infrastructure support to this unit.

UoC was selected in 2018 to host the **RDS NENC**, with the hub lead sited at our Fusehill Street Campus in Carlisle. The CRiHS Director is part of the executive group for RDS NENC and the NIHR representative (Hayes) is part of the CRiHS steering group. The RDS NENC provides:

- Research design and methodological advice to researchers who are developing applications for national peer-reviewed funding;
- Support for successful applicants;
- Advice (offered free of charge) via face-to-face by telephone and email, and video conferencing. As part of a national service, the service adheres to the RDS Charter.

The **NENC ARC** (secured in 2019) is a partnership that brings together six regional universities, the NHS, health and social care providers, local authorities, the voluntary sector, community groups, members of the public and others. The ARC's aim is to ensure 'better care for all people in all places' and facilitates applied and impactful research, public involvement and community engagement, knowledge implementation and collaboration. **Benham, Morris, and Donovan** serve, or have served, as ARC theme leads, and the ARC funds a senior research fellow (Bidmead, UOA20), two studentships and in October 2020, committed to invest £173,000 in research projects across a number of themes (one project involving ERR researcher Christie). This improves researcher capability and capacity in this unit.

Staff in this unit also benefit from the third theme of CRiHS - **Health and Society Knowledge Exchange (HASKE)**, which undertakes business development and commissioning activities aligning with UoCs portfolio (see Section 1.1.3). This is underpinned by focussed activity in tendering, networking, contract/grant capture and delivery of high-quality research projects. HASKE maintains a register of part time associate staff, with appropriate research skills to support delivery for unit staff as Principal Investigators. This track record resulted in an extensive portfolio of major commissioners including Morecambe Bay NHS Trust, Northern Cancer Alliance, NHS England, Northern Care Alliance, Health Education England, and North West Ambulance Service, securing £867,620 of research income (reported in UOA20).

3.3 Research income in support of impact activities

This unit has utilised research (and other types of income) to generate impact.

- In **MI**, research income to support research and development in medical imaging, has directly supported Impact0301, including funding for the human fetus study. **Booth** received a research grant from the College of Radiographers Industry Partnership Scheme to study readiness and resilience in graduate radiographers, the subject of an additional reserve impact case study.
- In **RAHL**, **Cox's** contribution to the NIHR Programme "SCENE" and her role as Chair of the Royal College of Occupational Therapists, contributed to a reserve ICS regards benefits to occupational therapy programmes and interventions.
- In **HA**, **Spain's** 'noisy knees' project has led to further partnership with Lancaster and Sheffield and has strong potential for a future ICS. **Hayes** utilised funding from the Peel Trust to develop an ICS demonstrating an influence on medical policy, investigations and therapy strategies, and on public engagement regards to exercise attenuating biological ageing.
- In **DIGH**, Reid's contribution to an externally funded telehealth study (**Reid1**) has helped to underpin an ICS in UOA20.

Research and development has provided opportunities for other staff to gain experience on externally funded research programmes, including **Wilby**, **Phillips** and **Reid** as well as other staff in different UOA's.

3.4 Campus investments, infrastructure and staff resources

In support of this unit's research themes, the £9 million Sentamu building at Lancaster campus, part funded by the Lancashire Enterprise Partnership (LEP), was opened in September 2017 by LEP Chair Edwin Booth. The building, which includes eight teaching rooms, a lecture theatre and student facilities, will help support the creation of more than 700 new health and social care jobs in the region by 2024. The building has also been used for a number of research lectures and events, including a Diagnostic Radiography Curriculum Development and Workforce Recovery conference (July 2019) which presented findings from **Booth's** funded study as well as collaboration with partners evaluating and developing the radiography curriculum.

In **MI**, a Health Education England grant (£395,000) was awarded to UoC for an 'Ultrasound Academy' centred on the university and working in partnership with two NHS trusts - Morecambe Bay NHS Trust and The Countess of Chester NHS Foundation Trust. The award will be used to create two dedicated training rooms located in both trusts that will house state-of-the-art ultrasound scanners. A subsequent extension bid was granted for £194,000, of which £38,141 will be ring-fenced for research, including an evaluation (Miller, 0.2FTE, 19/20) and Research Assistant 0.1FTE (19/20), conference fees and open access publications. Research on image perception has informed the specification of the computer suite used for radiography students. This includes medical grade calibration of monitors and special lighting. The facilities have been used by **Donovan** for research on fetal eye tracking and are available to PGR and staff researchers.

Where possible, investment in teaching facilities has been 'dual-purposed' to enable researchers to use equipment and inform teaching activities. In 2018, Physiotherapy Skills Labs were built at both Lancaster and Carlisle campuses. These have been used for research work by Rowe (Optijump machine, used to study jump kinematics and power), Sapsford (Biodex Balance System SD used for balance studies in stroke rehabilitation research), **Hayes** (range of equipment used in studies of change of testosterone levels with age, in men) and **Benham/Bampouras** (Isokinetic Dynamometer and Biodex Balance System for ageing balances studies and work on exercise regimes for older people).

For technician support, the unit has a senior sport science technician working with the physiology, biomechanics and other sport science equipment involved with research projects. In medical sciences an additional technician is trained in radiation protection, providing support for research involving different medical imaging technologies.

A range of strategic partnerships bring additional resource to IoH and CRiHS. For example, use of extensive secondary data sets held by Edukit and Healthwatch enable richer research to be undertaken by our staff. Partnerships with the local Integrated Care System and Clinical Commissioning Groups both provide access to a wider range of research participants (staff and patients) and means to disseminate research findings strategically. This unit also supported by institutional structures, such as MS Teams and Impact software to support research infrastructure (REF5a, 4).

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

Developing links with external organisations, research users and beneficiaries is a key aspect of staff development. Unit staff are supported (through Research and Scholarly Activity time and internal funding, REF5a, 3.1) to establish effective research collaborations, networks and practice partnerships. Staff increasingly hold esteemed positions on strategic boards and networks further enhancing knowledge exchange, often as a result of their research activity.

Within UOA3, research interests are diverse and connect with an impressive array of research users and audiences, across sectors and communities. Many staff have developed strong collaborations with stakeholders, as well as with academic partners.

4.1 Unit staff have engaged in partnerships and collaborations beyond academia.

For many, the traditional partnerships are with NHS and statutory care providers, but other staff more naturally link with sports organisations, community groups and social enterprises.

- In **RAHL**, **Walker-Small** has worked with Brathay Hall Trust on injury prevention strategies in marathon running with participants at the '10 in 10 marathons' fundraising events and has presented this research at the International Olympic Conference on injury prevention and illness in Monaco (2017). She has supplemented participants' training with injury prevention strategies with a workshop, booklet, videos and online resources reducing the injury rate from 5.2 to 3 per runner. **Elliott's** research has been used by Richard Wiseman, TV presenter, and uploaded as publicly accessible YouTube videos – '*Relaxing music for anxiety control*', and is used by music therapists.
- Across **MI** and **HA**, and through the work of **Donovan** and **Bampouras**, a significant programme has been delivered across the Lancaster and Morecambe Bay area regards to physical activity outreach amongst older residents. As this geographical area experiences a higher incidence of falls than most areas of the U.K., the secured research funding helped to develop and implement applied research into the area of postural stability and influenced directly the change in provision of such services. This occurred through community engagement with the Continuing Learning Group, Lancaster; and University of the Third Age as well as invited reports for the Isle of Man, Director of Public Health and Age UK.
- In **HA**, **Bampouras** and **Dewhurst** evaluated the physical activity in AgeUK's Lancaster Run. In addition, **Bampouras** worked with frail older dialysis and renal adult patients in the Westmorland and Royal Preston Hospitals, exploring the effects of exercise on strength, functional ability and postural balance. The work has won awards repeatedly at the Lancashire Teaching Hospitals NHS Foundation Trust, Research and Innovation Showcase. Dr Andrew Nixon (the medical doctor leading the team of which **Bampouras** was a part) was awarded Research Rising star.

Work with the public and community audiences is important for our researchers, with many taking part in TV and radio interviews or presenting at public events.

- In **HA, Spain's** work on 'Noisy Knees', and her published articles featured on BBC News and on the Today programme. **Spain** also collaborated with the Brathay Trust on '10 in 10 marathons', working with runners to assess biomechanical change. **Hayes'** work on high intensity exercise for clinical and younger populations with Carmarthen Healthy Ageing Project, demonstrated that only 3 min of exercise every five days provided improvements in vascular function, cardiovascular risk, body composition, aerobic, and muscle power, and these received coverage in The Times and The New York Times. **Dewhurst** and **Bampouras'** work on Scottish Country Dancing assessing functional ability and postural balance attracted widespread media attention from the printed electronic and TV press, including IT Border, Medical News Today and Scotland on Sunday.
- IN **RAHL, Elliott's** research on music for anxiety control has been reported in Radio Cumbria and Radio Wales.

4.2 Collaboration with other academic partners is important, and there are many longstanding examples.

A major collaboration is the NIHR NENC-ARC project, already mentioned above, that involves the universities of Northumbria, Durham, Newcastle, Teesside, Sunderland, as well as NHS organisations, local authorities and voluntary sector partners.

- In **MI, Donovan** and **Phillips** work integrally as part of a research group at Lancaster University on vision and perception. Since 2009, **Phillips** has worked with Loughborough University and Nottingham University on observer behaviour and search strategies in mammography imaging. **Donovan** collaborates with Waikato University, New Zealand, which has led to the award of funding from the Marsden Fund Council of the Royal Society of New Zealand in November 2020.
- In **HA, Bampouras** and **Dewhurst** worked closely with Associate Professor Dr Andrea Macaluso, University of Rome Foro Italico, delivering joint research projects and an annual research symposium
- In **RAHL, Cox** has been involved with successive EU projects with the same EU partners and Lancaster University. This collaboration has included joint publications, conference presentations and PGR mentoring. **Elliott** undertook a PhD Review in specialist music in Victoria, Australia (2019)

4.3 Unit staff have disseminated research through a range of avenues, including to key research users and beneficiaries.

- In **RAHL**, Presenting at conferences for professional clinical bodies is an important feature of our stakeholder engagement, leading to widening of networks and new collaborations. For example, **Cox** presented as keynote speaker at the 50th anniversary of the Cardiff University Welsh School of Occupational Therapy and delivered the Elizabeth Casson Memorial Lecture (2017). **Morris** has provided the keynote address at the Birmingham and Solihull Mental Health NHS Foundation Trust Occupational Therapy Conference (2014). **Walker-Small** gave a public lecture and workshop on 'Research informed injury prevention to multiday marathon runners' (2019).
- In **HA, Bampouras** gave keynotes at the Athletic Performance Conferences, Kavala, Greece on 'Performance Analysis: practical ways to use it and its application' and 'Muscular imbalances: impact on injury likelihood and their assessment' and at the American Society of Nephrology on the 'Frailty and quality of life in chronic kidney disease' with medical specialists (2017).

4.4 Unit staff contribute more broadly to the research base and are active in their professional associations.

- In RAHL, **Benham** is on the international advisory panel of the Editorial Board for the Chartered Society of Physiotherapy journal 'Physiotherapy'. **Cox** is Chair of Council for the Royal College of Occupational Therapists (RCOT) and **Youngson** is a member of the Research and Development Board. Youngson and **Wilby** contribute to 'OT News'.
- In MI, **Booth** is a member of the Research Committee of the College of Radiographers.
- In HA, **Kontziampasis** delivered a keynote at the MRC-Laboratory of Molecular Biology, Cambridge (2019) and **Bampouras** gave keynotes at the Athletic Performance Conferences, Kavala, Greece.
- UOA staff are involved in research reviews for journals out with their discipline and publish within other research networks, for example, in RAHL, **Elliott** has researched with psychologists and presented at the Psychological Division of Health Psychology Annual Conference in 2019 jointly with an applied psychologist (Wilbraham, UOA20) and a social psychologist (Miller, UOA20).

Several staff are active on editorial boards of international journals:

- In RAHL, **Cox** is on the Editorial Board for *British Journal of Occupational Therapy* and **Morris** is an accreditor for the Royal College of Occupational Therapists.
- In MI, **Donovan** is Editor of *Frontiers in Psychology Journal* and a member of the Cochrane Dementia Group and Airways Group.
- In HA, **Bampouras** is on the Editorial Advisory Board for the *Journal of Sport Sciences* and *Sport and Exercise Scientist* (official publication of the British Association of Sport and Exercise Sciences) and Review Editor for *Biomechanics and Control of Human Movement*, *Frontiers in Sports and Active Living*. **Bampouras** and **Hayes** Co-Edited 'Exercise in Ageing', a Special Issue in *Sports*.

Conclusion

UOA3 has experienced sustained growth since the last REF, with the incorporation of new researchers. Our new structures, particularly IoH and CRiHS, have ensured a strategic approach to staff development, targeting of opportunities, facilitation and support to research outputs, achievement of impact and securing of research income. Strong thematic focus is driving our future strategy, and is well integrated into organisational goals.