

Institution: University of Central Lancashire
Unit of Assessment: UoA3 Allied Health Professions, Dentistry, Nursing and Pharmacy
1. Unit context and structure, research and impact strategy

1.1 Introduction

UoA3 is a vibrant, complex, multifaceted area of the University's research activity which comprises approximately 20% of UCLan's REF2021 submission and involves world-class researchers across three Faculties and eight Schools. Operating at the leading edge of UCLan's Research Strategy, UoA3's infrastructure and research themes enable expert and agile responses to emerging research needs. New University Research Institutes and Centres facilitate interdisciplinary dialogue and collaboration across organisational boundaries. The positive interaction of these structures is reflected in this submission.

UoA3 is underpinned by a common commitment to developing and sustaining an academic community that enables staff, students, and partners to undertake internationally excellent, world leading research that is collaborative, crosses disciplinary boundaries and leads to real-world impact. Uniting UoA3 is a shared vision for high-quality research that positively impacts the health and wellbeing of individuals, families, communities and populations, and addresses health inequalities, contributing to levelling up regionally and to global (UN Sustainable Development Goals (SDGs)) efforts. Since 2014, UCLan has made substantial investments in its infrastructure (including the £200m Masterplan programme) and research community, to ensure a vibrant and sustainable environment conducive to the delivery of outstanding research within UoA3, including:

- **2015:** Launch of UCLan Medical School, with a five-year MBBS programme. This increased research capacity, capability and activity via initiatives such as the Mackenzie Institute (see Table 3), and a bespoke postgraduate medical education programme leading to DProf (six students enrolled).
- **2017:** Establishment of University Research Institutes. UoA3 staff are at the heart of the LIFE Institute and are key partners in the Citizenship, Society and Change Institute.
- **2018:** Development of six overarching UCLan research themes and UoA3-specific sub-themes highlighting our research strengths, expertise, ambitions and investments.
- **2019:** Launch of new transdisciplinary University Research Centres, four led by UoA3 researchers.

The impact of these investments is demonstrated through successes including:

- The National Institute for Health Research (NIHR) Applied Research Collaboration North West Coast (NIHR ARC NWC) achieved £9m with matched funding, led by UCLan with Liverpool and Lancaster Universities, and another 60-plus member organisations. This follows a CLAHRC NIHR match-funded £23m grant. UCLan's Watkins is Implementation and IMPaCT lead; Clegg leads the MIDAS theme; and UCLan is training lead organisation, supporting PhD studentships and internships.
- Our Stroke Research Team, led by the UK's only two nursing Professors of Stroke Care, is the largest nurse-led stroke research team in the world. The NIHR Global Health Research Group has awarded UCLan c£2.4m for improving Stroke Care in India.

- BIZIFED2, a transdisciplinary project to determine effectiveness and acceptability of zinc-biofortification of wheat as a low-cost, sustainable solution to increasing dietary zinc intake and addressing zinc deficiency on a population scale in Pakistan (Lowe, £1.7m; 2019-2021).
- JUST/2013/Action Grant EU-MADNESS – *EUropean-wide, Monitoring, Analysis and knowledge Dissemination on Novel/Emerging pSychoactiveS* (Davidson, €635k), cross-European study exploring pharmacological effects of Novel Psychoactive Substances (NPS).
- Delivery of systematic reviews with and membership of the World Health Organisation Technical Team to inform five global guidelines (antenatal, intrapartum and postpartum care, postpartum haemorrhage, and caesarean section), resulting in reframing the focus of these guidelines towards the importance of positive experiences and safe care (Downe, £175k).

1.2 Unit context and structure

The UoA3 environment promotes research quality and real-world impact at a global level. Figure 1 shows the central research themes, and UoA3 sub-themes, together with transdisciplinary Research Institutes (Table 1) and Centres (Table 2), enabling interdisciplinary and collaborative working across methodological and institutional boundaries.

Table 1: UoA3-related Research Institutes

Research Institute for Global Health and Wellbeing (LIFE)

Bringing together researchers from the faculties of Health and Wellbeing and Clinical and Biomedical Sciences to enhance and enable globally relevant health and wellbeing research, collaborations and impact (see illustration 3).

Research Institute of Citizenship, Society and Change

Combining research strands from four Faculties into a critical mass of extensive transdisciplinary work focused around social justice, sustainability, relationships, risks, safety and communities.

Table 2: UoA3-led Research Centres

Centre for Global Development (C4Globe)

Bringing together successful research teams from cross-university subject disciplines to develop equitable international research partnerships tackling major societal challenges including malnutrition, foodborne disease, and climate change, focusing on the SDGs of the UN 2030 agenda.

Centre for Transdisciplinary Health Research for Thriving in the Early Years (THRIVE)

Investigating interactions between factors and mechanisms influencing human survival, flourishing, and transformation in the first 1000 days of life; implementing and evaluating resulting solutions.

Centre for Brain and Behaviour

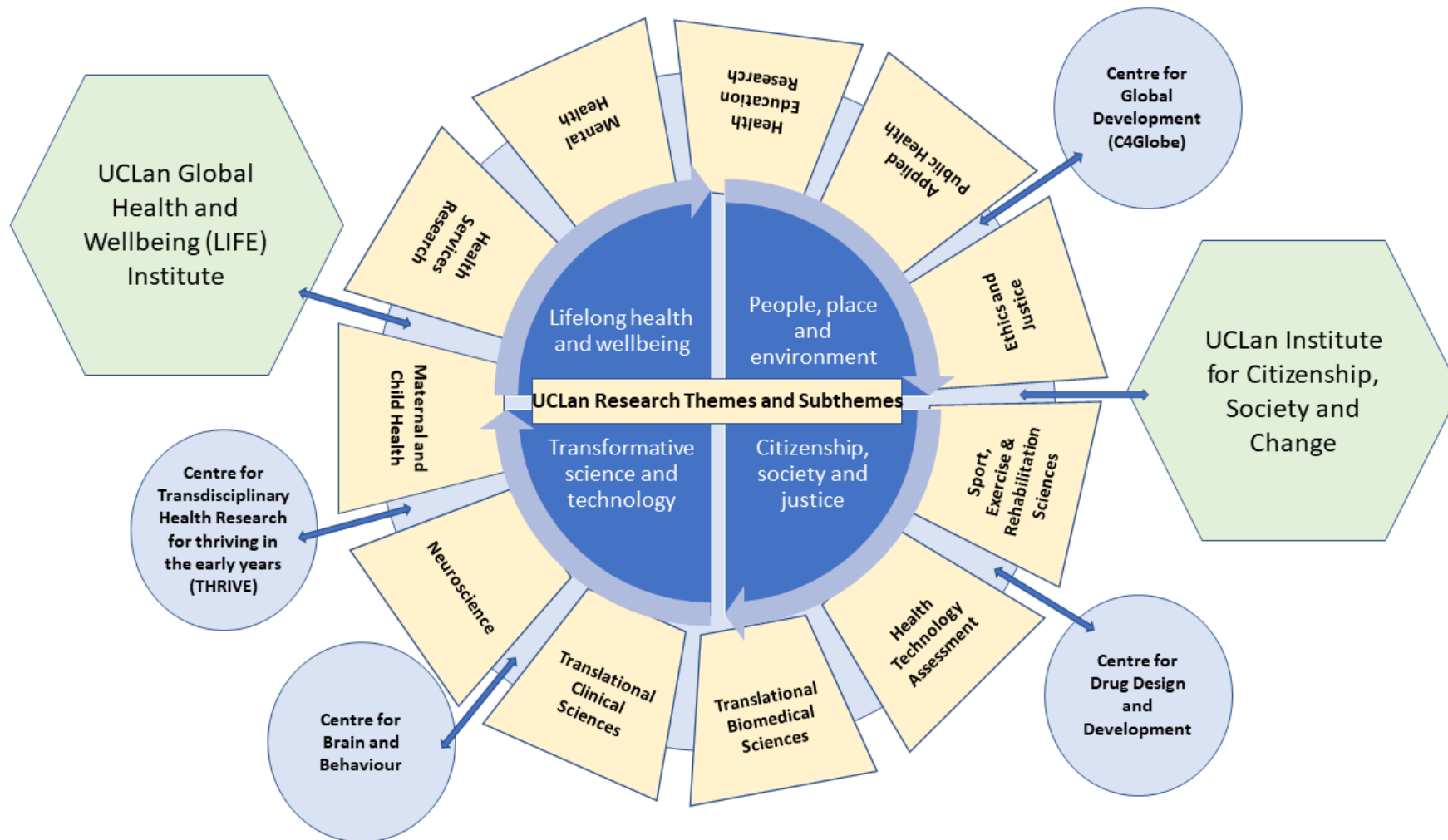
Biomedical scientists, psychologists, clinicians and chemists working together to further understanding of the brain and its disorders, developing novel treatments for Central Nervous System disorders. A collaboration with UoA4 staff, the Centre works with national and international community and academic partners and specialises in dementia and neurodegeneration, psychiatric illness, cognitive neuroscience and neuroscience drug design.

Centre for Drug Design and Development

A bench-to-bedside approach to the discovery and development of new therapies for diseases, using both traditional medicinal chemistry and computational chemistry approaches.

NB: staff are also involved in other interdisciplinary research centres reporting through other UoAs

Figure 1: UCLan UoA3 Context - Research themes, sub-themes, Institutes and Centres



1.2.1 Research sub-themes

Each sub-theme (Table 3) is comprised of a research group(s) led by a senior researcher(s) with a remit to promote interdisciplinarity and reciprocity, implement strategic vision, and support development of world-leading and internationally excellent research. UoA3 researchers include experts in core clinical disciplines, including ethics, biomedicine, public health and social sciences and a range of research methodological specialisms, enabling rapid expert and agile responses to emerging research and policy questions, and business and clinical needs. This was exemplified in responses to Covid-19, with the establishment of a research-led UCLan MedTech Solutions Group to solve problems faced by NHS trusts in the immediate- and longer-term.

1.3 Research and impact strategy

UoA3's vision is to strengthen and further develop world-leading research that has a significant impact on the health and wellbeing of diverse populations, communities, patients, carers, families and individuals. We aim to make a difference to people's lives through developing new biomedical techniques and applying innovative public health and social care interventions, transforming health and social care services, and influencing health and social care policy. This operates alongside social work activity returned to UoA20.

Since 2014, strategically-driven investment in UoA3 has catalysed significant expansion of interdisciplinary working and development of people, strengthening and extending our world-leading research standing. The establishment of our Medical School (2015) also provided opportunities for increased specialisation and interdisciplinary research to inform clinical practice and policy.

Building upon faculty and school research strategies and action plans post REF2014, the latest University-wide Research Strategy (2018-20) provided increased strategic impetus and incentives for research across organisational and disciplinary boundaries. UCLan Research Institutes, Centres, themes, and sub-themes facilitate multi- and inter-disciplinary working and provide a critical mass of researchers across basic science, conceptual, observational, experimental, and applied quantitative and qualitative research, e.g. the LIFE Institute enables collaboration amongst clinical, biomedical, allied health, health sciences, engineering, statistics and methodological specialists. Strategic objectives focus on integration and collaboration across disciplines and engender a programmatic approach within associated research groups conducting innovative research: from conceptual, to development of novel interventions, through to evaluation, dissemination and implementation.

The institutional strategy ensures that focus remains sharp and, within the richly diverse UoA3, work continues to develop around core central strategic themes, targeting the right support at the right level. Cross-fertilisation of skills, knowledge and experience between areas of research maturity and more embryonic developments is an effective tool in building capacity, capability and confidence. We will continue to deploy resources wisely, facilitating growth and promoting interdisciplinarity, particularly through Institutes and Centres. Core activity around income, publication and impact remains our focus and we will develop further prestigious collaborations and links with communities from local to international levels – guided by key performance indicators developed with central support.

Table 3: UCLan Research Sub-themes and Groups relevant to UoA3	
Research Sub-themes	Research Groups (Leads)
Applied Public Health: health protection and health promotion; operating across UoA3 and UoA20.	Nutritional Sciences (Lowe): addressing the global challenge of hidden hunger Applied Food Safety Studies (Wallace): food safety performance from farm to fork
Ethics and Justice: returned to UoA30	International Justice in Health Group (Schroder): focuses on WHO and UN priorities and key contributions to C4Globe.
Sport, Exercise & Rehabilitation Sciences: operating across UoA3 and UoA24.	Allied Health Research Unit (AHRu) (Richards): increasing understanding of allied health practice and improving patient quality of life.
Health Technology Assessment: interdisciplinary research groups with methodological expertise and evidence syntheses.	Lancashire Clinical Trials Unit (Watkins): design and delivery of health-related trials for UCLan and external organisations. Health and Wellbeing Research Methodology and Implementation Hub (HeRMI) (Thomas, Clegg): supports generation, translation, and implementation of evidence for innovation and improvement in health.
Translational Biomedical Sciences: translating laboratory research to beneficial applications in healthcare.	Drug Design and Delivery (Forbes): new drugs, formulations and characterisation tools for delivery and targeting of therapeutic agents in treatments. Hosts and Microbes (Garcia-Lara): micronutrients, microbiota and pathogenesis. Nanomedicine (Singh): nanotechnologies to overcome biological barriers, enabling treatment of human diseases.
Translational Clinical Sciences: collaborative research with health care organisations.	Mackenzie Institute of Clinical Research (Chauhan): a collaborative research network of UCLan Medical School, NHS (East Lancashire CCG and East Lancashire Hospital Trust) and third sector partners, enabling grass-roots upwards research through network events, statistical and bidding support, seminars, and CCG-funded research scholarships.

Research Sub-themes	Research Groups (Leads)
<p>Neuroscience: neuro-scientific research and clinical application.</p>	<p>Neuro-oncology (Alder/Shaw): focuses on serum biomarkers for detection of brain tumours, potential molecular targets and signalling pathways for chemotherapy and novel chemotherapeutic agents.</p> <p>Molecular Psychiatry (Davidson): researches psychiatric and related illnesses including drug abuse, autism, sleep and schizophrenia.</p> <p>Dementia and Neurodegeneration (Crean/Beglopoulos): investigates a wide spectrum of conditions and diseases (Alzheimer's, Parkinson's, Huntington's, Frontotemporal dementia), focusing on both neurones and glia.</p>
<p>Maternal and Child Health: research groups linked through membership of the THRIVE Research Centre.</p>	<p>Research in Childbirth and Health (ReaCH) (Downe): focuses on the nature of childbirth and associated organisational practices, the views and experiences of childbearing women, their families, and maternity staff.</p> <p>Maternal and Infant Nutrition and Nurture Unit (MAINN) (Dykes): focuses on political, cultural, psychosocial and economic influences.</p> <p>Supporting Evaluation and Research in Child and Family Health (SEaRCH) (Whittaker): early life and parenting support, the impact of loneliness on health/wellbeing and experience of violence, gender, and health.</p>
<p>Health Services Research: programmatic research to improve the quality, effectiveness and efficiency of nursing and allied-health interventions</p>	<p>Stroke and Older People's Care Group (Watkins): patient-centred, clinically generated, applied health research across the stroke pathway.</p> <p>Cancer Care Group (Beaver): working with cancer survivors, developing and evaluating innovative interventions to meet their support needs.</p> <p>Pharmacy Practice (Manfrin): researching procedural- and cost-effectiveness of pharmacy contracts and practices.</p>
<p>Mental Health and Wellbeing: operating across UoAs 3, 20 and 30.</p>	<p>Mental Health (McKeown): progressive developments in practice and critical thinking around complexities of experiences of mental distress in its social context, with integral patient and public involvement (PPI).</p>
<p>Health Education Research: pedagogy and educational research to influence teaching practice.</p>	<p>Patient Safety (Gordon): medicines safety and human factors.</p> <p>Assessment (McLachlan/Gordon): synthesises biomedical and health sciences research evidence within international networks.</p> <p>Medical Education Research Group: bringing research and non-research staff together to develop ideas and build research capability, capacity and confidence across Dental, Pharmacy and Medical Schools</p>

In line with the University Research Strategy (2018-2020), there are six strategic objectives across UoA3:

OBJECTIVE 1: Provide appropriate support to academics and research students in their research endeavour, relevant to their career stage.

UoA3 provides a range of research student, ECR and MCR initiatives including support groups, mentoring processes, writing coaching for publications and grant capture and face-to-face and on-line training. Senior staff receive support for career and research development through appraisal systems, funding-support, and the peer-led College of Professors and Readers. Section 2 ('People') provides further details.

OBJECTIVE 2: Deploy internal resources to support areas of research and encourage collaboration and development of inter-, multi- and trans-disciplinary research.

Research Institutes, Centres and Groups are key structures for supporting collaboration and strengthening research across themes and sub-themes. A major benefit of bringing together interdisciplinary research groups within UoA3 has been greater access to methodological expertise (see for example, the Health Research Methodology and Implementation Hub, 3.2.6). UoA3 also hosts NIHR Research Design Service North West (RDS NW) staff who advise NHS, social care and research staff on design of research studies of importance to UK health and social care for submission to competitive calls.

Section 3 highlights further examples of UCLan's infrastructure for internal and external research support.

OBJECTIVE 3: Increase the external profile of the University as a research provider and a place of research for academics and students.

Researchers across UoA3 exceed the requirements of University policies on Open Access and Open Data, through full use of Central Lancashire Online Knowledge (CLoK) repository and the deployment of innovative and evidence-supported routes to ensuring research processes and results are transparent and widely accessible. Staff share data, skills, and knowledge through a range of outlets including online networks, social media, industry and public-facing publications, online access to seminars and ongoing engagement activity. Examples include:

- 'Easy-read' research materials and findings in accessible formats of co-produced research exploring barriers and facilitators to healthcare for people with learning disabilities, e.g. *Community Living Magazine*, 2020; Jan. Vol 33(2):24-25 (Health Technology Assessment Group within the NIHR ARC NWC).
- Instigating, hosting and sharing data from the social media 'Babies Born Better' survey (in 23 languages), focusing on women's experiences of maternity care geo-mapped to place of birth anywhere in the world. The first two rounds generated over 80,000 responses from over 60 countries. The dataset is used by in-country teams for the first year after each round, and is then made available to any researcher, policymaker, or service-user who wishes to use the data appropriately. As far as we are aware, there is no other accessible dataset of this size and scope available about women's experiences of maternity care.
- An online initiative to support research capacity-building for Allied Health Professionals and promote implementation of research into practice. Using social media platforms, activities feature open access research publications and guided discussions around open access to research relevant to clinical practice. All activities are publicly accessible and free (Roddam).

- UoA3 researchers have written over 30 articles for The Conversation over the REF period (readership of 1.3 million) on topics as diverse as the rise in “freebirthing”, Alzheimer’s links to gum disease, and biofortification to solve global hunger.
- Students within UoA3 research groups regularly present to national and international conferences, often supported by Institute and Centre competitive funding, e.g. Ijeoma Ukonu (Applied Public Health) presenting her food security research at the 4th International Conference on Food Security, December 2020.
- Sixteen UoA3 researchers have accessed support funds for open access (OA) resulting in 27 additional OA publications across the REF period.

See section 4 for further information on external collaborations and the external profile of UoA3 researchers.

OBJECTIVE 4: Build and promote successful collaborations, internally and externally with business and community organisations, as well as other HEIs.

Since 2014, research addressing global issues involving international collaborations has significantly increased in UoA3. Much of this focuses on UN SDGs related to health issues, deprivation and vulnerable groups. Senior researchers have been supported in undertaking research with international collaborators; holding visiting fellowships at academic institutions in other countries; and leading and/or contributing to international policy or research groups. Further information is provided in Section 4.

Over the REF period, UoA3 has invested £193k in hosting 30 visiting professors and distinguished visitor fellowships, bringing a wealth of expertise and international research collaboration.

Supported by central resources, UoA3 researchers (Downe and Dykes) have run two annual research conferences that have been hosted alternately by UCLan and overseas collaborators since 2001. Events attract up to 1000 attendees and have resulted in three self-funded overseas research sabbaticals with ReaCH and MaINN, facilitated by the University infrastructure and UoA3 staff.

£1.9m of research income during the REF2021 period comes from international sources, 23% from outside of the EU. UoA3 staff have successfully run two consecutive EU COST Actions (2010-2018, total of approx. €900k) involving over 120 participants from 32 countries and rated ‘world leading’ by EU COST. Contacts initiated at these events have resulted in overseas researchers becoming integrated within UoA3 research groups on a funded part- or full-time basis.

UoA3 involves and engages service-users, communities and the public in identifying issues and co-producing, conducting and disseminating research to develop responses (see Impact Case Studies). Staff are supported to develop national and international partnerships as a basis for tackling population health needs, resulting in collaborations with local, national and international bodies, e.g. health trusts, social care organisations, community and voluntary groups, businesses, NHS England, and the World Health Organisation (WHO). These links and networks facilitate the rapid translation of UoA3 staff research into national and international policy and practice. Our commitment to Patient and Public Involvement and Engagement is covered in more detail in section 4.

OBJECTIVE 5: Provide a leading contribution to developments in the area of policy, practice, technology and services as a civic and anchor institution.

UoA3 is focused on supporting staff to deliver research with real-world impact, whilst also enabling organic opportunities for more ‘blue sky’ endeavour, which can lead to paradigm shifts and transdisciplinary synergies. UoA3 utilises central support systems to maximise research impact and this is reinforced by School Heads and Research Leads. UoA3 research impact has been built on empowering academics to use university time and funding to follow potential leads, attend national

and international events, establish and co-ordinate networks, and develop innovative communication channels to catalyse dissemination and application of our research into practice. For example, the impact achieved by the ReaCH team originated from an invitation by the WHO Reproductive Health team, based on our innovative approach to qualitative metasynthesis. Visits to WHO have been supported by UCLan (travel costs funded by WHO, staff time by UCLan), a pattern continuing for a wide range of collaborative WHO/UCLan activity. WHO funded a series of reviews undertaken by the ReaCH team, which framed the philosophical approach for a series of WHO guidelines (antenatal, intrapartum, postpartum, postpartum haemorrhage and caesarean section to date). This impacted maternity care around the world, including a recent series of WHO infographics relating to maternity care and Covid-19 that have been globally disseminated, discussed, and integrated into Covid-19 recommendations and practices. ReaCH/WHO collaboration has continued, resulting in joint bidding activity including service-user and staff engagement in implementation projects in India and China.

The Impact Case Studies submitted to this REF evidence the level of international influence on research policy and practice in the UoA3 sphere. In addition, we have a pipeline bringing younger/developing areas of impact on board, e.g. on demand 3D tablet printing (Forbes), molecular markers and drug development for early diagnosis/treatment of neuro-oncology (Alder/Shaw), improving care of people with learning disabilities (Chauhan). UoA3 staff are also engaged in impactful interdisciplinary research that is being returned under other units of assessment, e.g. aspects of Davidson's work in UoA4, AHRu team working across UoA3 and UoA24, Krysmann's work in UoA12.

OBJECTIVE 6: Provide the development and support for our research environment to enable the University to meet external benchmarks at a high-quality level.

In line with the university's strategic aims, UoA3 works to produce high-quality research in a supportive and enabling environment, to achieve social, environmental and academic impact and improved performance in national and international excellence frameworks. We continue to develop a culture and environment that supports research excellence, attracts and retains research staff and students who can be the strong research leaders of the future, and generates and sustains thriving high quality international collaborations.

UoA3's commitment to enhancing its culture and environment led to many contributions to our successful Faculty of Health and Wellbeing Athena Swan bronze award in 2018. Likewise, the UoA actively implements the institutional commitment to the Concordat on researcher's career development. Our approach values 'how' we move forward as well as what our actions achieve. Sections 2, 3 and 4 illustrate our approaches to people, facilities and collaboration to make this happen.

UCLan has a well-established, mature and thorough ethical review procedure for approving all projects conducted by University staff or students that involve human participants, personal data, human tissue, or animals. The University Committee for Ethics and Integrity is the formal body responsible for developing and implementing ethical policy and procedure, which is then administered by the Research Governance Unit. The dedicated Health Ethics Review Panel is the usual path for UoA3 applications. UoA3 researchers are committed to the highest standards of integrity and professionalism, as reflected in the Universities UK Concordat to Support Research Integrity (see Institutional Environment Statement). UCLan subscribes to two online courses on research ethics provided by Epigeum (Oxford University Press): *Becoming an Ethical Researcher* and *Research Ethics in Practice*, authored by Chatfield and Schroeder of UCLan's Faculty of Health and Wellbeing. These courses are mandatory for all academic staff and encouraged for research support staff. Schroeder and Chatfield (returned under UoA30) are also lead authors of the *Global Code of Conduct for Research in Resource-Poor Settings* (GCC), which

was developed to prevent ethics dumping and is being applied in around 40 different countries. UCLan was the first European university to sign up to the GCC.

The Institute/Centre model perfectly suits the interdisciplinarity of UoA3 and catalyses a wide range of opportunities for staff to develop ideas; deliver creative, responsive internationally excellent research; and achieve real-world impact. Whilst Institutes/Centres are relatively new, our commitment to interdisciplinarity and its impact is evidenced in both our impact case studies and environment illustrations.

Mature monitoring systems and reporting mechanisms ensure strategic objectives are achieved. Faculty Research, Innovation and Ethics Committees report into the University Research and Innovation Committee and utilise key performance indicators based on centrally provided data. The work of Research Institutes and Centres is incorporated within these structures and as these mature, we will review and develop new strategic objectives that capitalise on our strengths and respond to REF2021 outcomes. UCLan is committed to maximising research strengths, extending international leadership in research-informed and user-inspired health innovation solutions across the full portfolio of UoA3.

Looking to the future, UoA3 at UCLan, comprises a leading element of institutional research activity and has significant plans for development. Responding to the forthcoming government 'plan for growth', UoA3 will strategically consider the 2050 net zero target, as well as ongoing Covid and post-Brexit trade conditions. An annual research and innovation investment of circa £10m is planned as, institutionally, we look to the R&D Roadmap, Strengths in Places Fund, Shared Prosperity Fund and the Industrial Strategy. Our vehicles for strategic growth in UoA3 are aligned with these developments and include our UCLan Health Innovation Programme (including, MedTech solutions, Mental Health, Social Prescribing and a proposed Bio-medical & Health Technology Park). Institutes and Centres (many directly linked to UoA3), will continue to grow and focus resource and effort. Our commitments to other agendas such as the Concordat, KEF and the next REF will naturally also help shape our strategic direction.

2. People

Development and support of our people within a positive research culture is central to UoA3's strategic approach to vitality, sustainability and international excellence in research. From targeted recruitment, through training and mentoring, to funded sabbaticals, international conferences and research collaborations, development is tailored to individuals' career stage and research journey.

2.1 Staffing strategy and staff development

Sustained strategic investment in staff at all levels has ensured the development of a critical mass of researchers, allowing increased delivery of high-quality research outputs and enabling growth of emergent research groups in response to national and international priorities. With 23 Professors, and 10 Readers amongst the total 89 staff (Table 4), new senior research staff appointments and promotions have significantly strengthened the academic base. Interdisciplinary Research Institutes and Centres play a key role in supporting development of ECRs (10) and mid-career (42) researchers (MCRs). The ECRs within this UoA3 submission represent 20% of the overall UCLan ECR total, a significant increase on the 1/60 submitted in REF2014.

In line with the University's commitment to the *Concordat to Support the Career Development of Researchers*, staff complete an individualised induction programme, recognised as a standard for good practice by Investors in People awards. The annual appraisal system has been modified to ensure appropriate assessment of research performance, with self-appraisal checklists for research staff at different grades, helping facilitate discussion about career development and performance support needs.

Title	Number of Staff
Professors	23
Readers	10
Principal Lecturers/Senior Managers	8♦
Senior Lecturers	26*♦
Lecturers	11*♦
Senior Research Fellows	5*♦
Research Fellows, Research Associates	6*♦

*Category includes *ECRs; ♦MCRs*

The University offered centrally-funded sabbatical programmes for researchers which supported 7 UoA3 staff in this REF period. For UoA3, this was supplemented by specific 'local' schemes, e.g., in the Faculty of Health and Wellbeing, 18 staff studying towards a PhD as developing researchers were supported with a three-month sabbatical for thesis completion.

Senior research staff within UoA3 are active in leading the UCLan College of Professors and Readers, and mentor ECRs and MCRs to facilitate high quality outputs including submission of manuscripts to high impact journals and bids to research bodies. Staff are also supported through funded opportunities, time and coaching to present at national and international conferences, attend networking events and committees. Less experienced researchers are invited onto research student supervisory teams and have opportunities to complete a Postgraduate Certificate in Research Degree Supervision and, since 2020, work towards the UKCGE Research Supervisor Recognition

Scheme, led by UCLan National Teaching Fellow, Clive Palmer (3 UoA3 staff in pilot group). Extensive training is available to research staff at all levels, e.g. NIHR's research leadership training. Watkins has received two NIHR Senior Investigator awards and is now NIHR Emeritus Professor - one of few non-medics to achieve this status.

UoA3 researchers utilise the Epigeum Research Skills Master programme and the Researcher Toolkit for early to mid-career staff, which includes critical analysis skills, bid writing, writing for publication, time- and project-management. Vitae membership has enabled staff to participate in the Vitae Researcher Development Framework and staff are actively encouraged to undertake CPD. UoA3 hosts workshops and retreats for writing publications and grant applications. A Faculty of Health and Wellbeing Conference, *Research with Impact*, is now in its sixth year and includes prestigious external and internal speakers, ECRs and research students, with prizes for best student presentations and posters. In February 2020, there were 318 conference participants, including undergraduate students (64%), postgraduate (taught and research) students (19.5%), staff (13.5%) and invited guests (3%).

2.2 Research students

UoA3 actively supports student development from UG level through to PhDs and beyond, including internships appropriate to all levels. For example, an Undergraduate Research Internship Programme (Illustration 1) offers students the opportunity to work with researchers on projects over the summer months. Since the scheme was launched in 2008, there have been over 600 interns, with 60 supporting UoA3 researchers. At the end of the internship, interns present posters of their work to the Vice-Chancellor, senior researchers, academics and invited guests. Interns with winning posters are invited to attend Posters in Parliament and the British Conference of Undergraduate Research.

Illustration 1: *Undergraduate Research Internship Programme*

"As a former undergraduate student at UCLan, I had completed an internship over the summer before my final year. This experience greatly impacted on my understanding of research methods and helped me to develop my research skills and career ambitions. I was supported by staff in the school to complete a participant reflection on the experiences as an intern becoming part of a community of practice, which was published in the peer-reviewed undergraduate journal, UCLan Diffusion.

Now a Research Fellow in the School of Nursing, this year I had the opportunity to have an intern working with me over the summer. This internship gave me the opportunity to develop my line management skills and work with a student in a different discipline to mine (sociology and education). The student supported me with data collection and analysis on a project that examined the impact of loneliness on physical and mental health across the transition from primary to secondary school. She is currently considering the possibility of completing a PhD when she finishes her degree studies and has used her reading of literature over the summer for the internship to develop a related dissertation." - *Dr Rebecca Nowland, Research Fellow, School of Nursing*

"I have thoroughly enjoyed and thrived on my experience as a research intern, I have been pushed to recognise my own ability and the qualities I can bring to a research project. My supervisor has been completely encouraging throughout the internship which has given me the confidence in my own ability that I was previously lacking". - *Joanne Harris, Undergraduate Intern*

There have been 125.5 research degree completions within UoA3 during the REF period, comprising 122.0 PhD awards and 3.5 Professional Doctorates and showing a generally steady growth across the seven years (Table 5). Research student recruitment has been enhanced by bursary schemes and scholarships for clinical researchers, collaborations with international universities and specific initiatives. In addition to University investment (approximately £2m) to support UoA3 studentships over the REF period, UoA3 secured external funding for studentships from organisations including the Higher Education Academy (HEA), Wellcome Trust, Human Fertilisation and Embryology Authority (HFEA) and the Marie Curie COFUND. Since 2014, the Allied Health Research Unit (AHRu) has attracted over 50 ERASMUS-funded staff and students to work with research staff and use the research facilities including the AHRu's advanced Movement Analysis Laboratory (Section 3). The reputation of the AHRu has attracted staff and students from outside Europe including Brazil (3), Thailand (2), Canada (2), South Korea (1), and some doctoral graduates have progressed to NIHR postdoctoral training fellowships and HEFCE / NIHR Senior Clinical Lectureship Awards, as well as senior posts within the health service. Additional living cost bursaries were offered to students unable to continue laboratory/field work during Covid-19 lockdowns.

UoA3 provides a supportive and academically stimulating environment for research students to thrive and ensure timely completions. All students have at least two supervisors with a Director of Studies (DoS) overseeing the supervision. Students are embedded within the research group of their DoS, but the thematic structure facilitates interdisciplinary supervisory teams and access to methodological support. Supervisors include clinicians or practitioners, where appropriate.

Research students within UoA3 make full use of the University's comprehensive training programme as described in the institutional environment statement. UoA3 students participate in the Graduate Research School Annual Research Student Conference and three-minute thesis competitions, which showcase student research and provide awards for outstanding work, and engage with relevant research group, Centres and Institutes, and School / Faculty seminars.

Illustration 2 demonstrates how UoA3 nurtures talented clinicians and students into academic and research careers.

Illustration 2: Postgraduate Studentship to NIHR Collaboration Theme Manager

Alison Doherty was awarded a competitive postgraduate studentship in October 2014 from the NIHR CLAHRC NWC to enable her to undertake a full-time PhD programme supported by the UCLan School of Nursing. In January 2018, Alison obtained her PhD entitled: *The Tailoring and Implementation of Evidence-Based Multi-Component Weight Management Interventions for Adults with Intellectual Disabilities who are Obese: A Whole Systems Approach*. To date, three papers from her PhD have been published in peer-reviewed journals. She has presented at various conferences and seminars, including a winning presentation to a panel of experts at an NIHR training event.

Following completion of her PhD, Alison was appointed to a one-year Postgraduate Research Internship within the Faculty. She has also been involved in innovative cross-Faculty projects and presented a paper to the World Congress of the International Association for the Scientific Study of Intellectual and Developmental Disabilities (IASSIDD) in August 2019. In 2020, Alison was appointed as the NIHR ARC NWC MIDAS Theme Manager and Research Fellow in the Health Technology Assessment Group, School of Sport and Health Sciences and is currently working on several research programmes and projects to tackle health inequalities and improve patient and public health and wellbeing.

Table 5: Annual Doctoral Completions by UoA3 Research Group								
Research Group	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Total
Applied Public Health	0.25	1.25	0.5	1.25	1.00	1	2.50	7.75
Forensics	1	2	2.5	2.75	3.00	4	1.00	16.25
Health Education Research		1	0.5		0.50	0.75	2.00	4.75
Health Services Research		3.75	4	0.25	3.25	5.75	2.75	19.75
Maternal and Child Health		0.75	2.25	0.25	2.00	3.5	5.75	14.5
Neuroscience		1	1	1	0.75		1.50	5.25
Sport, Exercise & Rehabilitation Sciences	0.25	0.25		0.75	0.25		1.25	2.75
Statistician - across subthemes			0.25	0.75		0.75	0.50	2.25
Translational Biomedical Sciences	4	6.75	8.25	3	8.25	8.75	8.25	47.25
Translational Clinical Sciences	0.5		1.25	1.5	0.75	0.75	0.25	5.0
Total	6	16.75	20.5	11.5	19.75	25.25	25.75	125.5

NB. Fractional values denote full completions with supervision shared across other UoAs

2.3 Clinical Academics

UoA3 involves NHS clinicians in collaborative working through honorary positions and fractional appointments. Clinical staff have held secondments, returning to positions within the field when projects have completed. Internship and clinical academic faculty opportunities are built into research collaborations such as the Collaboration for Leadership in Applied Health Research and Care (CLAHRC; now ARC) and UCLan/Lancashire Teaching Hospitals NHS Foundation Trust (LTHFT) cross-organisation Clinical Academic Faculty programmes (see below).

Clinical Internships: The Faculty of Health and Wellbeing has led two innovative clinical academic research internship programmes, building research capacity and capability through funding from Health Education England and NIHR. These programmes have enabled 39 healthcare professionals from five NHS hospital Trusts in the North West of England to undertake research training and conduct research directly informed by, and relevant to, their clinical practice. With supervisory support from Faculty / UoA3 staff, internships have enabled practitioners to experience a research role whilst optimising their clinical expertise. Outcomes have included: changes in clinical practice such as adaptation of patient identification wrist bands for patients with dementia (included as an NHSE case study of good practice); career promotions; published abstracts; national and international conference presentations (e.g. World Congress of Physical Therapy Conference); blogs (Cochrane Collaboration); peer-reviewed publications (e.g. British and Irish Orthoptic Journal, Disability and Rehabilitation); NIHR Pre-doctoral Fellowships; and NIHR Clinical Academic Doctoral Fellowships.

UCLan managed the capacity-building theme and supported internships for CLAHRC North West Coast from February 2015 to September 2019. During this period, 67 interns from local authorities and healthcare organisations (including NHS Primary Care, Acute Trusts, Tertiary Centres, Mental Health Trusts, a Cancer Centre, and CCGs) were supported to complete projects. Projects addressed health inequalities and health and wellbeing priorities important to the interns' employing organisations, patients, service-users and carers. Outputs and impacts from these programmes include a publication and subsequent change in service delivery for a Recovery College; publication of an evaluation supporting expansion of Consultant-led community cardiovascular disease services; extended funding and support following the evaluation of a Community Connectors service, helping to reduce levels of loneliness, social isolation and low level mental health experienced by residents; and funding for NIHR Masters in Clinical Research, NIHR Clinical Academic Doctoral Fellowships, and NIHR HEE Pre-Doctoral Bridging scheme.

UCLan / LTHFT Clinical Academic Faculty: Building on a history of successful research collaboration, UCLan and LTHFT created the cross-organisation Clinical Academic Faculty (CAF) to foster development of interdisciplinary research, innovation and knowledge exchange to grow and nurture world-class, home-grown research and innovation that improves health services, health outcomes and health experiences.

Working with partners, the CAF offers and supports clinical academic research opportunities for early- and mid-career researchers in nursing, midwifery and allied health professions. In addition to signposting and connecting people with shared research goals, the CAF has five research capacity and capability building initiatives: Research Engagement Programme; Clinical Academic Trainee and Research Internships; Research Development Group; Writing Support Series; and Rapid Conversion of Evidence Summaries.

The impact of the CAF for early- and mid-career researcher development is illustrated by:

- 2019 British Journal of Midwifery Practice Team of the Year Award for work led by two Clinical Academic Trainees.
- Two cohorts (44 LTHFT practitioners) have completed the Research Engagement Programme.

- 25 research projects from nurses, lay researchers, speech and language therapists, physiotherapists, academic nurses, medics, medical students, radiographers and psychology wellbeing practitioners presented at and reviewed by the Research Development Group.
- Three six-month writing support series delivered to over 100 academics and practitioners, with resources and materials also used by other UCLan Schools and Faculties to support their writing support activities.
- Over 50 writing and dissemination achievements (including a book, 16 journal articles, 14 conference posters, ten oral conference presentations and one doctoral fellowship application).
- Forming a key component of LTHFT's 2018 self-assessment report of the clinical academic training for Health Education England's (HEE) Quality Framework annual monitoring process.

Mackenzie Institute of Clinical Research: a collaboration between the School of Medicine, NHS Trusts, Primary Care networks and the third sector. The Institute seeks to create a sustainable research network, building capacity and supporting grass-roots upwards research involving clinical staff and academic researchers. The Institute has hosted collaborative UCLan / NHS research workshops, Primary Care conferences and research days, and an annual Mackenzie Lecture Series commenced in 2019, plus 3 CCG-funded Mackenzie research fellowships for doctoral students, ECRs and established researchers.

2.4 Equality, Diversity, Inclusion and Communities (EDIC)

UCLan welcomes and celebrates diversity; a commitment reflected in the shared values of those who work and study with us. As a University, we proactively work to promote and embed the principles of Equality, Diversity, Inclusion and Communities in everything we do, through a range of equality awards, accreditations, networks and equality leads. We strive to ensure that this is central to all policy development, decisions and practice, and that employment, study and other services are genuinely accessible to everyone.

In UoA3, this approach has included focus on the Athena SWAN (AS) equality and diversity award and initiatives such as intersectionality forums, stakeholder involvement, e.g. through COMENSUS (see Section 4) and research engaging with EDIC groups. Building on UCLan's AS Bronze Award (2014 / 2020), the Faculty of Health and Wellbeing committed to a vision of a healthy, supportive and fair workplace where everyone is treated equally, securing AS Bronze in April 2018. This evidenced good practice including consideration of unconscious bias, the Home-Grown Talent initiative (where posts are advertised internally in the first instance) and learning opportunities around broader issues such as intersectionality. The Faculty Self-Assessment Team (SAT) continues to meet regularly, progress actions and raise awareness within a wider EDI agenda. Notable achievements to date include a Professional, Technical, Administrative and Support (PTAS) Staff Forum launched in 2018, giving staff a voice to influence action on issues that are important to them.

Since November 2017, 12 staff have been moved from fixed-term to permanent contracts. Exit interviews are actively encouraged to capture reasons for leaving and enable learning around staff retention. In 2018 a gender-sensitive pilot mentoring programme was launched for 16 females across the Faculty (10 PTAS, six academic). Eight intersectionality awareness forums were conducted in 2018 with monthly forums in 2019/20, led by 19 intersectionality champions working at School level. A Gender Equality Survey was conducted across the University in October 2019. Work is on-going with HR to make the staff induction and handbook more inclusive for PTAS and research staff. Since 2014, 10 women across UoA3 have completed the Aurora Leadership Programme, with four of them subsequently being internally promoted.

Recently, staff in UoA3 have been helping to develop a new stream of work titled Changing the Research Picture. It aims to explore the underrepresentation of BAMME (Black, Asian, Minority

and/or Migrant Ethnicity) students, academics and staff within higher education settings and contribute to levelling the playing field and increasing representation within the research environment.

3. Income, infrastructure and facilities

3.1 Income

UoA3 research income for the REF period totals £14.2m (Table 6), with a significant growth in annual income since 2014. Income in 2013/2014 was £1.5m rising to £2.4m in 2019/2020 (a 57% increase). Approximately £3.9m (28%) of this income was awarded by UK government departments, indicating the impact of UoA3 research on national policy and practice; £2.2m (17%) derived from non-UK sources (including £1.5m from EU sources), evidencing international reach and impact; and 4% (£626k) from national and international businesses and industry.

In the last five years (2015-2020), UoA3's award funding comprised 237 individual awards from large funding bodies including WHO, Wellcome Trust, NIHR, and the NHS, and smaller charities such as The Stroke Association, St Catherine's Hospice, and the British Heart Foundation. Five projects also received Global Challenges Research Funding (GCRF). Major awards (over £1m) impacting significantly on local, national and global health include:

- NIHR ARC NWC, hosted by NHS Liverpool CCG. £9m plus match funding (including £2.7m to UCLan) to work collaboratively with clinical partners and the public to reduce health inequalities and improve population health.
- BIZIFED2: Biofortification with Zinc and Iron for Eliminating Deficiency in Pakistan. £1.9m from the Biotechnology and Biological Sciences Research Council (BBSRC) and the Global Challenges Research Fund (GCRF) to address zinc and iron deficiency (PI Lowe).
- ICONSII: Identifying Continence Options after Stroke. £1.4m from the Health Technology Assessment (HTA) programme to compare effectiveness and cost-effectiveness of a systematic voiding programme with usual care in reducing the severity of urinary incontinence in patients with stroke (PI Thomas).

All areas of UoA3 contribute to income generation, relative to size and maturity of research teams. Teams are supported in their development and income generation through a strong research infrastructure (see 3.2), effective organisational structures (Section 1) and supportive research culture (Section 2). Research Institutes and Centres are beginning to evidence impact on UoA3 income generation capacity through increased awareness of grant opportunities, peer-reviewed bids, and ensuring researchers have the academic, administrative and financial support needed.

Research Group	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Applied Public Health	48,235	109,301	6,673	135,142	114,208	136,609	249,404	879,572
Forensics	4,279	916	-	-	-	-	-	5,195
Health Education Research	5,000	51,632	73,775	78,796	28,914	37,572	30,893	306,581
Health Services Research	963,007	1,451,483	1,125,070	807,054	821,371	1,260,962	1,001,947	7,440,028
Health Technology Assessment	6,206	44,323	96,752	156,086	302,331	570,834	552,031	1,728,564
Maternal and Child Health	170,947	130,500	226,012	362,595	283,204	187,339	135,119	1,495,718
Mental Health and Wellbeing	-	-	11,166	13,834	-	-	-	25,000
Neuroscience	4,823	9,103	2,276	7,118	25,777	66,037	199,106	354,240
Sport, Exercise & Rehabilitation Sciences	11,052	-	40,055	37,450	44,327	27,509	131,862	283,120
Translational Biomedical Sciences	342,701	294,432	256,699	129,109	119,032	113,555	127,411	1,382,938
Translational Clinical Sciences	4,319	70,498	13,740	20,800	81,073	95,183	26,181	311,794
Grand Total	1,560,569	2,202,188	1,932,217	1,747,984	1,820,236	2,495,600	2,453,954	14,212,749

NB: The interdisciplinary nature of research by UoA3 researchers means large proportions of research and income are returned under other UoAs, e.g. the Allied Health Research Unit returns across UoA3 and UoA24

3.2.1 Research Institutes and Centres led by UoA3

The importance of UoA3-led Research Institutes and Centres (Figure1, Tables 1 and 2) is discussed throughout this document. Illustration 3 expands on the LIFE Institute.

Illustration 3: *UCLan Global Health and Wellbeing (LIFE) Institute*

Established in January 2018, the LIFE Institute brings together researchers from Nursing, Allied Health, Sport and Health Sciences, and Clinical and Biomedical Sciences to enhance and enable globally relevant health and wellbeing research.

With investment support of £913k since inception, LIFE has enabled development of over 40 new interdisciplinary research collaborations, establishment of 25 research writing groups to prepare and submit external funding applications, and has funded 30 research ideas development meetings. Twenty-five individuals have been supported to access research meeting facilitation training. Over 350 researchers, including national and international partners are actively involved with LIFE.

Researchers who have secured funding from the Institute feel more equipped to apply for larger, external grant awards. LIFE provides a supportive infrastructure for career development, particularly beneficial to mid-career researchers, and enables the production of high-quality research funding applications, publications and impacts. LIFE fosters research capacity- and capability-building and engagement and involvement of patients, carers and the public.

3.2.2 Faculty of Health and Wellbeing Research Support Team (RST)

The Faculty of Health and Wellbeing RST was established in 2012 to enhance research infrastructure support by providing a core pool of skilled academic and administrative staff who could work flexibly to meet the research needs of researchers in UoA3 and beyond. The RST consists of 20 members, 12 academic (9.5 FTE) and eight administrative (7.4 FTE).

This is an invaluable resource for our vibrant and diverse research community. RST members are highly qualified in their fields, with over 50% holding PhDs. They have expertise in biological and clinical sciences, biomechanics, economics, genetics, health care, psychology, and public health. RST staff provide flexible provision for multiple projects simultaneously, which facilitates research planning and ensures continuity of support over a project's lifetime. The RST assists with literature and systematic reviews; bid writing; quantitative and qualitative research tasks and data collection, entry, and analysis; report writing and drafting papers for publication.

3.2.3 Lancashire Clinical Trials Unit (CTU)

Lancashire CTU was established in 2012 to enhance the research environment for UoA3 staff. Continued investment and commitment from a strong interdisciplinary team led to Lancashire CTU being awarded prestigious UK Clinical Research Collaboration (UKCRC) provisional registration in October 2019.

Lancashire CTU has a strong track record in coordinating multi-centre trials and large complex interventional studies from design and initiation to high-impact publication in peer-reviewed journals. The CTU develops and delivers trials from conception to dissemination and has expertise in delivering earlier-stage feasibility trials and later-stage trials investigating the effectiveness of interventions. The portfolio includes research trials and other well-designed studies resulting from national and international collaborations including stroke, midwifery, cancer, public / population

Unit-level environment template (REF5b)

health and mental health. To deliver on this comprehensive programme, the CTU employs 25 staff with expertise in trial and data management, information systems, statistics, quality assurance, training and business.

3.2.4 Medical Education Research Group (MERG)

An interdisciplinary community of pedagogical researchers from Faculty of Clinical and Biomedical Sciences led by five professorial leads. MERG's role is to mentor and support staff engagement with educational research and has supported ECR grants and the development of peer-reviewed papers and other publications.

3.2.5 Biomedical Evidence Synthesis and Translation (BEST) Unit

Focusing on evidence synthesis across biomedical and health sciences research, BEST houses an editorial review group satellite centre for Cochrane Gut in partnership with McMaster University, Canada (specialising in systematic reviews of health care intervention directed at ulcerative colitis, Crohn's and other intestinal disorders). It is also part of the Best Evidence Medical Education Collaboration (BEME), an international collaboration of individuals, universities and professionals committed to development of evidence-informed medical and health education (Gordon chairs Executive Committee).

3.2.6 Health and Wellbeing Research Methodology and Implementation Hub (HeRMI).

HeRMI draws on the expertise of senior researchers across the research sub-themes to support generation, translation, and implementation of evidence for innovation and improvement in health care. HeRMI provides advice on research design including statistical analysis, clinical trials, systematic reviews and evidence synthesis, health economics, quantitative and qualitative methods, implementation and clinical biomechanics.

3.3 Facilities

UCLan's £200m Masterplan represents a major investment in new state-of-the-art facilities for students and staff. The creation of large and modern social spaces enhances opportunities for sharing research ideas through networking of researchers from different disciplines and career stages. The £35m Engineering Innovation Centre (EIC) is an advanced teaching and research facility, offering direct links with industry and providing a test bed for projects solving real-world challenges around areas such as medical technology (for example through MedTech Solutions Group, a collective of scientists, engineers and technicians with expertise in mechatronics and intelligent machines, additive manufacturing, design and development of medical devices, computer vision and machine learning and health sciences). UoA3 research utilises cutting-edge research laboratories, including the state-of-the-art Movement Analysis Laboratory (Illustration 4). This facility enables clinical researchers, engineers and scientists to collaborate on new techniques for assessing and managing musculoskeletal and neurological conditions, and develop and evaluate the effectiveness of products designed to interact with the body.

UoA3 benefits from excellent pharmacy and biomedical laboratory facilities which provide state-of-the-art equipment for preparation of various conventional solid and liquid dosage forms including tablets, capsules and gels. A suite of 3D printers allows accurate layer by layer design for pharmaceutical preparations, with distinct advantages to clinical practice (e.g. children's dosage issues, forming our work with Alder Hey Children's Hospital). Investment in an animal research facility provides opportunities to address research questions unsuited to the *in vitro* approach. A spectroscopy laboratory facilitates development of point of care diagnostics with uses in the operating environment, most notably cancer excision, and a potentially significant role in dementia diagnosis, enabling minimally invasive techniques. The creation of the Blood Brain Barrier facility

Unit-level environment template (REF5b)

with a unique and acknowledged in vitro model allowing for a range of testing opportunities as well as neurodegenerative or oncological interactions, has been a leading development. Partnership and financial investment (£300k) have brought access to the world class research facilities in Alder Hey Hospital's Research on the Park Institute, allowing colleagues to collaborate with specialist clinical colleagues.

UoA3 researchers also utilise UCLan Learning and Information Services and facilities, including a wide range of specialist software, databases and journals, support with literature search skills, and office/ meeting space for research students.

Illustration 4: *The AHRu Movement Analysis Laboratory*

The Movement Analysis Laboratory is one of the top facilities of its type in Europe. It is equipped to conduct advanced motion analysis, force measurement, electromyography, accelerometry, pressure measurement, muscle and strength assessment, tissue oxygenation monitoring and thermal imaging. The laboratory houses a 10 camera Oqus 7 Qualisys movement analysis system, four AMTI force plates, 32 channels of telemetry EMG and Inertial Measurement units, and state-of-the-art EMG Decomposition capability. Several custom-made pieces of equipment in the laboratory have been developed with commercial partners.

The Laboratory contains offices for visiting researchers and has supported 16 research students (10 PhDs) to completion since 2014, currently supporting a further 10 PhD students reported across UoA3 and UoA24. The Laboratory is an important arm of the £3.5m ERDF funded "Innovation Clinic" (see 4.2) and staff are involved in steering the EIC, which provides students with experience of real-world projects and allows access to facilities for local and international industrial partners.

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

Staff across UoA3 seek, develop and lead interdisciplinary collaborative opportunities and are involved in numerous local, national and international collaborations. This section illustrates some key examples across the breadth of UoA3 activity to give a flavour of the contribution to the research base, economy and society.

4.1 The Research Base

4.1.1 National and International Research Collaborations

UoA3 collaborations involve Institutes, Centres, sub-themes research groups, and individual staff members and groups collaborating externally. Staff have developed virtual collaboration groups as well as participating in and leading traditional research collaborations. Some collaborations are formally funded whilst others are given time and other less tangible support to enable emergent ideas and novel networking approaches. International and national collaborations include:

- NIHR Global Health Research Group for improving Stroke Care in India (Watkins, Lightbody, Georgiou), a £2.4m collaboration (2017-21) involving Indian, Australian and British clinical and academic partners.
- International and interdisciplinary collaborations with colleagues in Pakistan, USA and UK to explore sustainable solutions to improving diet quality in low and middle-income countries (Lowe), funded by BBSRC and GCRF - £1.9m (2019-2021).
- Salus, the Food Safety Culture Science Group (Wallace) – a collaboration of 26 researchers from 14 universities in six countries, that has supported development of PhD students and ECRs, published group position papers and formed the basis for an ongoing EU COST Network proposal with 58 proposers from 22 countries.
- RESNETSLT, a Europe-wide research support network with >3,400 Twitter followers in speech and language therapy (Roddam), supporting researchers and research-into-practice implementation through blogs, tweekchats and twitter journal clubs.
- NIHR funded (£2.3m) collaboration on personalised treatment packages for adults with learning disabilities who display aggression in community settings (Chauhan), involving university and NHS partners across England, Scotland and Northern Ireland.
- National Centre for Remote and Rural Medicine recently established to focus on remote and rural medical education and research in collaboration with global colleagues. Located at UCLan's West Lakes campus, the Centre is accredited by the Royal College of Surgeons of England.

Illustrations 5 and 6 demonstrate the effectiveness of a strategy that supports external and inter-faculty collaboration towards high-quality research and significant real-world reach and impact.

Illustration 5: Collaboration between UCLan and the Abaseen Foundation

Lowe's longstanding collaboration with the Abaseen Foundation, a charitable body dedicated to improving the lives of those who live in one of the poorest and most deprived areas of Pakistan, has enabled the building of research groups and networks working in rural Pakistan to tackle micronutrient deficiencies and hidden hunger.

Lowe is an international expert in the field of nutrition, with extensive experience of leading international interdisciplinary networks to address the global challenge of malnutrition, and a trustee of the Abaseen Foundation UK. The partnership is currently conducting the first large-scale investigation into the potential of biofortified wheat to reduce zinc and iron deficiencies among adolescent girls and children in Pakistan (BIZIFED).

Illustration 6: Increasing Research Capacity and Collaboration with Health Care

Chauhan is a practising GP combining roles as a researcher and leader to contribute to the knowledge base of tackling health inequality in health and social care, improving quality at local, regional, national and international levels. Establishing the Mackenzie Institute, which has benefitted from a number of academic clinical fellows jointly funded by the local CCGs, he has also helped to create an expert network within the policy field through links with organisations such as the RCGP; within health and social services through service user groups and health professionals; and academic institutions through the Special Interest Group to support improvement in the care of patients with learning disability within the Society of Academic Primary Care and CLAHRC (ARC). This has led to the development and implementation of local and national guidelines, most recently to support care during the Covid Pandemic. Chauhan is a member of NICE guideline development groups and standing member for the Quality Standards Committee.

4.1.2 Engagement with Professional Societies and Bodies

UCLan supports UoA3 staff as members of Professional Societies and Bodies, valuing this engagement as enabling transfer of research into practice and policy, assisting in dissemination of research to practitioners, facilitating professional development and providing research-led guidance to professionals, the public, government and other stakeholders. Examples include:

- Goodwin: Advisor to International Committee of the Red Cross (ICRC), and member of Forensic Advisory Board
- Lowe: Secondment to UK Research and Innovation: Challenge Leader for the Global Challenges Research Fund (2017-2021)
- Davidson: Member of Expert Group for UN Office of Drugs and Crime (UNODC) (2017-18)
- Crean: President of the British Dental Association North West Branch (2013-2014 and 2017-2018); Robert Bradlaw Advisor Faculty of Dental Surgery Royal College of Surgeons England; Clinical Director for NHSE e-Den Postgraduate Dental learning package
- Beaver: Executive Committee Member, British Psycho-social Oncology Society.

4.1.3 Participation in Peer-review Processes

Research staff in UoA3 regularly participate in scientific peer review processes, including for journals, fellowships, awards, grant applications and expert review panels, for example:

- Watkins: NIHR (Postdoctoral Research Fellowships, Research Methods Fellowships and Internships, Health Technology Assessment - HTA), Stroke Association and Medical Research Council (MRC)
- Connell: NIHR Health Services and Delivery Research Programme, NIHR Research for Patient Benefit Programme (RfPB), Physiotherapy Research Foundation, Stroke Association, Chartered Society of Physiotherapy, Guy's and St Thomas' Charity, Medical Research Foundation and Dunhill Medical Trust
- Richards: Medical Research Council, Engineering and Physical Sciences Research Council (EPSRC), NIHR RfPB, Dunhill Medical Trust, National MRC Singapore, Icelandic Research Fund, and Austrian Academy of Sciences
- Wallace: FCT Portuguese Joint Activities Program (PAC 2015)

Unit-level environment template (REF5b)

- Lowe and Ohly: Global Challenges Research Fund (GCRF) and Newton Fund Agile Response Call to address Covid-19 in 2020
- Davidson: Expert Witness for Psychoactive Substances Act (PSA 2016), Member of British Pharmacological Society Awards Panel and British Council Science Review Panel; MRC grants, Polish Academy of Sciences, Sir Jules Thorn Charitable Trust, NC3Rs, BBSRC, British Council
- Crean: NIHR HTA and RfPB, and Royal College of Surgeons of England Professorial proposals
- Chauhan: NIHR RfPB and Policy Research Programme, Diabetes UK, Society of Academic Primary Care and Royal College of General Practitioners
- Wright: Chair, Regional NHS Ethics Review Committee (HRA).

4.1. Fellowships and Awards

UoA3 is proud to include members recognised within the UK honours system, such as Professor Dame Caroline Watkins, DBE (services to stroke and nursing care) and Professor Soo Downe, OBE (services to midwifery). The many staff achieving academic honours and awards are similarly appreciated within UoA3 and UCLan more widely, including:

- Connell: Fellowship, Association of Chartered Physiotherapists in Neurology (2016)
- Watkins: Life After Stroke Special Recognition Award, Stroke Association (2016)
- Wallace: Fellowship, International Academy of Food Science and Technology, IAFoST (2020)
- Crean: Honorary Fellowship, Faculty of Dental Surgery, Royal College of Surgeons and Physicians, Glasgow
- McGlen and Wright: UUK *Made at Uni Lifesavers Award* for Public Psychiatric Emergency Assessment Tool to help police officers identify and respond to people with mental health issues (2019).

4.1.5 Journal Editorships

UoA3 staff contribute to numerous scientific journals, from participating in peer-review processes, though Associate Editor and Editorial Board memberships, to Editor and Editor-in-Chief roles. Selected examples, to list but a few, include:

- Goodwin: Editorial Board member, *Science and Justice*
- Wallace: Editor-in-Chief, *Food Safety Management in Practice*, launching with Wiley in 2021.
- Davidson: Editorial Board member, *European Journal of Pharmacology* and *Progress in Neuro-Psychopharmacology and Biological Psychiatry*.
- Crean: Editor-in-Chief, *Faculty Dental Journal* Royal College of Surgeons, England.

In addition, Hall Moran founded the journal *Maternal and Child Nutrition* (MCN) in 2005 and is now Senior Editor, in conjunction with Perez-Escamilla (Yale University). The journal addresses fundamental aspects of nutrition and its outcomes in women and their children, in early and later life, focusing on new initiatives, latest research findings and innovative ways of responding to changes in public attitudes and policy. MCN's impact factor is 2.789, ranking it 12th of 128 nutrition and dietetics journals (Scimago Journal Rankings). Over 6,000 institutions worldwide offer access to *Maternal & Child Nutrition*, an increase of 13% from the previous year. Low cost or free access is also available to nearly 8,000 low-middle income country institutions. The journal received over 670 new article submissions in 2018, an increase of 31% compared with the previous year. Similarly, article downloads increased by 21% in 2018 to over 300,000 article downloads per year, comparing favourably with an average increase of 14% across all Wiley journals in the Nutrition & Dietetics area. In July 2019, MCN became Open Access, further broadening the reach of the journal, enabling

Unit-level environment template (REF5b)

free access to articles irrespective of specialty, host institution or location. This will position MCN as the go-to destination for high-quality funded research in child and maternal nutrition.

4.2 Contributions to the economy

Aligned with our commitments to KEF and real-world impact, UoA3 researchers are encouraged to contribute to all levels of the economy, including work with businesses (SMEs to major international companies), health care providers and networks. Selected examples include:

- Richards leads the Allied Health Research unit (AHRu) alongside Connell, Chapman and Chohan, and the Biomechanics arm of the ERDF funded “Innovation Clinic” (£3.5m) which provides product testing facilities for SMEs (100 in last four years). Moreover, AHRu provides prototype testing for DJO LLC., one of the largest suppliers of rehabilitation products in the world, contributing to the economy by assisting local, national and international companies.
- Health and Med-tech innovations include Lancashire Health Matters partnership with the NHS Innovation Agency to support Lancashire SMEs access NHS and health and social care markets; the MedTech Solutions Group, formed during the COVID-19 crisis to enable fast responses and rapid development of products with businesses to solve problems faced by NHS trusts in the pandemic and longer term; and MediComm, the Med-tech Innovation and Commercialisation Accelerator, a collaboration between UCLan and Lancashire NHS Trusts to develop NHS clinicians’ research into commercially viable products and services.
- Members of the Pharmacy team (Forbes, Oga, Isreb) have made pioneering research contributions to the field of 3D printing of medicines. UCLan holds five patents in this area. Our “benchtop to bedside” translational strategy is applied through membership of the multi-university/hospital network “Paediatric Medicines Research Unit” based at Alder Hey Children’s Hospital, where we have explored the acceptability of novel tailored age-specific 3D printed medicines.
- Forbes was part of a c£1m Innovate UK grant-winning consortium on biopharmaceutical analytics “Towards a Condensed Platform for Protein Aggregation Profiling”. UCLan was the only university in the partnership with Malvern Panalytical (lead), Paraytec, Medimmune (AstraZeneca), GSK, FUJIFILM Diosynth Biotechnologies and CPI. Appropriate administration and use of biologics was recognised with an international dissemination event “Your product in their hands: Towards predicting biopharmaceutical aggregation in practice and use”, held at UCLan. Following this, Forbes was part-seconded to Fujifilm through an Innovate UK Scholars award to work on continuous manufacture of biopharmaceutical medicines; an area of prescient need for enhancing vaccine production.
- At regional and sub-regional level, UoA3 staff participate in North West groups including the Lancashire and South Cumbria Academic Health Partnership (SEED), The Northern Health Science Alliance (NHSA), and the Academic Health Science Network (AHSN) for the North West Coast, and members holds key positions within the Lancashire Enterprise Partnership (LEP) Health Board (Crean is Chair) and Digital Board.

UoA3 also supports small collaborations with business partnerships through to potential spin out companies, e.g. the UCLan-Cultivate HEIF / Partner match funded Food Safety Culture for Business Improvement project (£86k) and Thermal Imaging in Maternity Care (Illustration 7).

Illustration 7: Thermal Imaging in Maternity Care

Thermal imaging is a non-invasive technique offering new options for visualising the position and movements of the foetus in relation to those of the mother during labour. This work is led by Downe and Topalidou. Building on 2014-2016 work through two EU-funded COST Actions, this was further developed with the award of a UCLan Investment Voucher (£20k), involving a transdisciplinary team and industry partner (Rinicare Ltd), and resulting in a proprietary database and a prototype of thermal imaging glasses (product).

In 2017, the UCLan thermal imaging team, with Rinicare Ltd and clinical collaborators at East Lancashire NHS Trust, moved the thermal imaging work into a clinical practice setting (Innovate UK £94k). This project led to a further development of the prototype (TRL6 level), which received international attention (e.g. Armenia “Research Centre of Maternal and Child Health Protection”). Simultaneously, links with Switzerland were supported through three grants involving work in the field of salutogenesis and professional orientation in maternity care professionals. UCLan’s Innovation team promoted and supported a successful application for the North of England Life Sciences Accelerator, with opportunities to meet investors, learn how to spin-out a company, and transform an idea into a product. The School of Community Health and Midwifery invested in a high-specification thermal imaging camera to reinforce the globally leading position of this work. Supported by UCLan’s Partnership Development Team, two Memoranda of Understanding have been signed with institutions in the Czech Republic and India to develop strategic alliances in research and education in thermal imaging applications in maternity care.

4.3 Contributions to society through public engagement

UoA3 has a vibrant public engagement portfolio ranging from expert roles in TV/radio interviews, through work with schools and colleges, writing for the Conversation and other public-facing magazines and websites, to activity where patients and the public are involved in in all parts of the research process through participatory research approaches. Examples include:

- Television programmes and webinars:
 - Panellists on *Question Health* (Sky TV): Beaver: The Big C; Wright: Mental Health; Gardner: Diabetes
 - Experts on sector public interest programmes: Wallace, The Truth about your Sandwich (Firecrest / Channel 4)
 - Webinars: Crean, Oral Cancer webinar highlighting role of public health in addressing risk factors
- Partnership with the Royal Institute Young Scientist Centre offering interactive workshops linked to the school curriculum.
- Project with the Royal Academy of Engineering to inspire young people under-represented in STEMM, particularly girls, reaching 381 children during 2018/19 through 76 sessions in primary schools, Brownie Guide groups and community centres (164, 43% girls).
- Lancashire LEP Innovation Festival - opening plenary (Crean), highlighting the role of UCLan Health Research in the future health business developments in the region.

Unit-level environment template (REF5b)

- Writing for the Conversation:
 - *Why an antidepressant could be used to treat Covid-19* (Davidson, Nov 30 2020; 31,957 reads)
 - *Legal highs may be more dangerous than traditional drugs of abuse* (Davidson, Sept 2018; 10,062 reads)
 - *Alzheimer's disease: have we got the cause all wrong?* (Jones, March 28 2019; 73, 791 reads)

4.3.1 Patient and Public Involvement and Engagement

UoA3 has a strong commitment to Patient and Public Involvement and Engagement (PPIE), reflected through a range of research activities and approaches. This is exemplified by COMENSUS (Community Engagement and Service User Support), a service-user / lived-experience led initiative with dedicated staff, committee membership and facilities, and affiliation of groups and individuals from diverse communities across Lancashire. Supported by the service-user and carer community, research staff (McKeown), and affiliated to and funded by the University, COMENSUS is based on enduring and effective relationships underpinned by democratic principles that form a sustainable basis for on-going relationships between 'expert' service-users and researchers.

COMENSUS is a resource to mobilise service-user, carer and community involvement in research and research-informed-teaching, with hundreds of individuals and scores of community groups affiliated. It provides input into the development, design, implementation and dissemination of UoA3 research studies to ensure authentic public and patient involvement. Researchers can approach COMENSUS seeking help with study design, critical feedback on proposals, recruitment to steering groups, or various other forms of involvement.

COMENSUS has been a catalyst for wider service-user engagement activities, raising awareness of the benefits for research and inclusivity and disseminating research through end-user publications and conference presentations. Building on this, UCLan has invested in operationalising strategic thinking regarding best practice in supporting service-user engagement in research planning and delivery research. Specific developments include identifying funding for prioritising research questions and involvement in grant acquisition; creation of user / lived-experience researcher posts; and involvement in post-graduate research student supervision.

The annual *Celebrating Public and Patient Involvement in Health and Social Care Education* ('Authenticity to Action') conference fosters PPIE networks, innovation and critical reflection; recognises the impact of PPIE in health and social care education and research; and advocates for co-production and participation in research.

As part of UCLan's "Increasing Research Capacity in the Health and Community Care" (2018) initiative, the School of Medicine organised a Joint Research Day with East Lancashire Hospitals NHS Trust (ELHT) staff. The event showcased recent research and sought to develop new collaborative research areas between ELHT and UCLan staff. The Research Day was attended by UCLan researchers from various disciplines such as engineering, computer science, psychology, and health.

4.3.2 Community Projects

In addition to the activity already outlined, UCLan takes on its civic duty and role as an anchor institution with pride. UoA3 researchers are involved in key community projects including:

Heritage, arts and community engagement project Whittingham Lives: Operating on c£120k of Arts Council and HLF and other funding (held by and managed by community coalition with UCLan support), this project provides community and mental health service-user facing activities. It uses archive material to stimulate creativity in artistic media such as creative writing, theatre, visual arts, music, song-writing, followed by performances and public exhibitions. This has engaged people in appreciation of heritage and the arts and deepened public discourse around mental health. Scholarly outputs were interwoven with community engagement elements.

A play, choral pieces, and exhibition at Preston's Harris Museum engaged significant numbers of students from across disciplines. The play was directed and performed by graduates and final year UCLan Acting students. A 100-page booklet was designed and produced by Masters in Publishing students from the innovative UCLan Publishing. Whittingham Lives has left a substantial legacy in relationships, appreciation of the value of a publicly engaged university and written outputs including a special issue of Asylum Magazine, and scholarly articles. The University now sits at the centre of a thriving network including mental health and disability-oriented community groups, artists, archivists, museum curators and local government and health community engagement personnel.

Lancashire Science Festival (LSF): The LSF is an opportunity for research-active UoA3 staff and students to engage with different audiences and the public in UCLan's biggest public engagement event, with >10,000 visitors attending over three days. Two days of the event are aimed at KS2 pupils from schools throughout the North West, and the third day is open to the wider public. Every year approximately 50 staff (including UoA3 researchers) and students from across the Faculty of Health and Wellbeing deliver activities.

Through the *Hands On Hospital* activity, staff and students enable children to experience the learning environment, facilities and equipment used by students and researchers in the clinical skills labs and across campus. Fun and stimulating activities inspire a wider group of children to consider healthcare sciences, breaking down subject-specific gender stereotypes. Other activities include *Fuel my ride*, led by staff and students from Sports and Wellbeing which combines elements of sport and nutrition; the *Silent Disco*, led by staff and students from Community Health and Midwifery; the *Megabrain*, led by staff from the Stroke Research team; and the *Happiness Tree*, led by staff from the Mental Health team.

Preston City Mela (formerly Preston Health Mela): the University and Faculty of Health support this annual public event, which contributes to positive health and wellbeing of Preston's residents and promotes South Asian art forms and community cohesion across the county. Support for the Community Interest Company leading the event has included sponsorship, Board membership and other in-kind resources.

Summary

A complex research environment operating across eight Schools and three Faculties, UoA3 has responded to institutional strategy through structures that sustain and develop world-leading and internationally excellent research. We have invested significantly in a major shift in research strategy with the development of more organic, interdisciplinary Institutes, Centres and themes, which are beginning to evidence positive impact that will build towards the next REF.

We benefit from a strong and effective infrastructure, including the Research Support Team and Lancashire Clinical Trials Unit, supporting translational research and patient/ carer engagement through COMENSUS and other initiatives. Major developments such as our Medical School, new National Centre for Remote & Rural Medicine, Mackenzie Institute and MedTech Solutions demonstrate our agility and responsiveness.

These investments and infrastructure have, in turn, led to rising research income through the REF period, built on success with a range of prestigious funders. Strong relationships with the NIHR, CLARHC are mirrored by internationally recognised expertise around areas such as stroke (Watkins) and micronutrients in global malnutrition (Lowe). Impact Case Studies evidence substantial 'real world' research that makes a difference – locally, regionally, nationally and internationally. This submission includes 89 staff and reports on 208 publications with world-leading and international contributions across the breadth of UoA3. This success is built on an appreciation of our staff and our ongoing endeavour in areas such as Athena Swan, the Concordat, and development of Clinical Academic Faculty, ensuring staff can take advantage of development opportunities. Investment in our staff and their research enables them to make differences to people's lives.

In delivering high quality, culturally relevant, research to inform practice, underpinned by outstanding methodological expertise, we inspire, develop, and deliver the next generation of healthcare professionals. The vibrancy and diversity of UoA3 provides an environment conducive to maximising research potential through cross-fertilisation of skills and knowledge. The strategic pursuit of this, alongside a driving role in national levelling up policy initiatives, is central to UCLan's UoA3 further strengthening its world-leading role in research-informed and user-inspired health innovation solutions towards 2028 and beyond.