Institution: City, University of London

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

1. Unit context and structure, research and impact strategy

1.1 Overview

Research in Nursing, Midwifery and the Allied Health Professions within the School of Health Sciences at City, University of London has made a significant contribution to improving the health and wellbeing of a diverse range of people within the UK and internationally. We have strategically enhanced our research profile, with an increased emphasis on co-producing research with users, practitioners and policymakers alongside embedding the interdisciplinary focus introduced in 2012. The impact of our research has also been strengthened by further developing partnerships and engagement with service providers, users and other key stakeholders.

The School of Health Sciences (SHS) is one of five Schools at City. It comprises 18% of the student population (3,666 students) and 21% (174) of the academic and research staff at City. A restructuring into its present form in 2011 brought together sector-leading healthcare education and research expertise in nursing and midwifery, optometry and visual science, language and communication science, radiography, health services, health management and food policy. All research within the School, with the exception of the Centre for Food Policy's, falls within Unit of Assessment 3 (UOA 3) and all submitted staff (88; 76.8 full-time equivalent [FTE]) have a primary affiliation to one of five Research Centres: Applied Vision, led by *Lawrenson*; Health Services, led by *Aitken*; Language and Communication Science, jointly led by *Henry* and *Hilari*; Maternal and Child Health, led by *McCourt*; and Mental Health, led by *McCabe*. Research Centres support the development of staff and research students at all levels and provide a stimulating environment in which to undertake laboratory, clinical and population health research. Staff come from a wide range of disciplinary backgrounds, contributing to a vibrant, multidisciplinary environment. Our research vision is to enhance the health and wellbeing of people in their communities and nations by partnering with users, practitioners and policymakers to deliver research that is innovative, usable and policy-relevant.

We consolidated our strong result in REF 2014 by recruiting six new Chairs and making 44 other appointments at Lecturer, Senior Lecturer or Reader level. New appointments have been complemented by improvements in how we mentor and develop academic staff. A revised research strategy and improved organisational processes, alongside significant investment in new facilities and infrastructure – including bespoke laboratories, public-facing clinics, simulation suites and a dedicated area for research students – have underpinned our research achievements. Highlights include more than 2,100 outputs from staff listed in REF1, which have been cited over 21,000 times, and a 44% increase in the value of annual research grant awards, from £1.86M in 2013/14 to £2.69M in 2019/20, with a total value to City of £15.6M from 89 funding bodies over the assessment period. Our research students have published over 181 lead author papers cited more than 2,144 times. We have also expanded our pioneering activity in service-user involvement and co-production and increased partnerships locally, nationally and internationally. These include alliances with healthcare organisations, practitioners and users of healthcare systems that allow us to connect our research to policy and practice.

Growth of new and existing areas of research excellence is underpinned by a robust management structure and support processes. Research strategy is led by the Associate Dean for Research and Enterprise (ADRE; *Aitken*) working with the School Research Committee (all Research Centre Leads [RCLs] as well as chair of School Ethics Committee and PhD programme director). The committee reports to the ADRE and the University Research & Enterprise Committee. Central university support for research includes approximately 18 staff (grants, finance, contracts, ethics, research intelligence, enterprise) supplemented by five staff members based within the School who are easily accessible to researchers (School-level ethics, pre- and post-award support, business/enterprise development and statistics). These structures and systems enable individual members of staff and our Research Centres to respond rapidly to changing healthcare and health policy priorities in line with our vision.

1.2 Achievement of research and impact aims during the REF assessment period

We have made significant progress in the current assessment period against the aims set out in REF 2014. Our peer-reviewed publication rate, based only on staff identified in REF1, increased from 276 (2014) to 378 (2020), up by 36%. Citation rates in the first year of publication have also risen, from 133 in 2014 to 549 in 2020. Findings have been disseminated at hundreds of national and international meetings, an area the UOA deliberately invests in (£232K on 352 meetings since REF 2014) for researchers at all levels, including research students. The increase in quantity and quality of published outputs has been driven by 'horizontal' and 'vertical' growth in research grant income in line with our aims. Specifically, the number of staff who were awarded a research grant in each year rose from 10 to 20 (2013/14 to 2019/20), with the number of external grants awarded in each year rising from 12 to 28 over the same period. The total amount awarded per year rose from £1.86M (2013/14) to £2.69M (2019/20). As an indicator of the sustainability of this trajectory, the number of research staff and early career researchers (ECRs) supported to apply for research funding increased from 10 in 2013/14 to 17 in 2019/20, reflecting our emphasis on mentoring.

Increased international partnerships have led to some notable research outputs and funding. In addition to the achievements already noted in Section 1.1, this included *McCourt's* work with Brazil, *Lawrenson*'s work with the World Health Organization (WHO), *Mills'* work with the Department for International Development (DfID) and *Crabb's* work with European partners, which led to three successful European Union (EU) bids. Grants with partners have more than doubled, from five in 2013/14 to 16 in 2019/20. In line with our aims set out in REF 2014, grants with service providers have increased, from five (2013/14) to eight (2019/20). Staff increasingly work with colleagues in other UOAs at City and a number of grants recognise the innovative nature of these partnerships, such as the Stroke Association-funded 'EVA Park' project (*Marshall* and *Wilson* [UOA 11]) and the Biotechnology and Biological Sciences Research Council (BBSRC)-funded project on anticipatory advantage in sports decision-making (*Solomon* with *Yarrow* [UOA 4]). This is in addition to the increasing success of University Interdisciplinary Research Centres (REF5a); the Centre for Healthcare Innovation Research, of which the SHS was a co-founder, has already achieved funding success in the past 12 months, with several results still pending.

Our commitment to applied healthcare research implies that much of our work has impact. We have built on the success of REF 2014, where all impact cases were rated 3*/4*, by developing new impact in the areas of colour vision (*Barbur*), aphasia (*Marshall/Hilari*), community eyecare (*Lawrenson*) and midwifery-led care (*McCourt/Rocca-Ihenacho*), as well as continuing the REF-highlighted impact on quality of life in care homes and developing new impact on communication in the criminal justice system (*Henry*). In addition to these six examples, which form the basis of the Impact Case Studies presented in REF3, additional impact has been achieved in many other areas, including: perinatal mental health (influence on policy and practice); blood transfusion (the AFFINITIE programme influenced National Health Service [NHS] guidelines); early identification of children with learning difficulties (endorsement and use by clinical services); community mental health (two large research studies influenced guidance for new mental health pathways); technology-enabled care (evidence base for health professionals and service users); and the PostopQRS™, a psychological tool that allows the effect of new devices or patterns of care on recovery to be assessed, which has already been endorsed by professional organisations across Europe. These are just some examples among many derived from our research.

Links with charities, government organisations and commercial companies have been increased as part of our strategy to boost impact, foster enterprise activity and generate intellectual property. This includes collaborative research with NHS trusts as well as industry-funded research. The success of this strategy can be seen in the significant increase in research grant funding from these sources (see Section 3.1 for details). The School has also increased investment in public engagement events and consultations to ensure that research proposals reflect issues and outcomes of importance to stakeholders. For example, the Colour in Health and Employment Symposia, which ran in 2018 and 2019, provided important practitioner input to our submitted impact case study on colour vision testing in safety-critical environments (*Barbur*). Staff members in each Research Centre track potential impact and sit on the Impact Leads Working Group, which not only shares and disseminates information and expertise about developing impact to the Centres but has also distributed £614K of Higher Education Innovation Fund (HEIF) funding to

support impact development. There is clear evidence that our approach to impact is sustainable and that our research produces tangible results.

These achievements have been underpinned by changes to our research environment, structure and support mechanisms. The vision in 2012 was to break down traditional silos and foster multidisciplinary and interprofessional working as a pathway to greater interdisciplinarity. A large infrastructure project, completed in 2015 and described in Section 3.2, brought all academic and research staff and research students on to one site to facilitate collaboration and efficient management. We adapted our research structure and related processes in line with our vision and aims, and revised the Research Centre structure if cross-cutting themes, such as public health, had become established across all Centres. Further details of the changes underpinning our success are described in Sections 2 and 3 below.

Patient and Public Involvement (PPI) initiatives enhance the relevance and impact of our research while empowering the people for whose benefit the research is undertaken. Since REF 2014, all Research Centres have developed to include PPI. The pioneering work of the Service User and Carer Group Advising on Research (SUGAR), hosted in the Centre for Mental Health Research and led by *Barlow,* has inspired and trained similar SUGAR groups nationally and internationally (e.g. in Germany and Japan). A Research Advisory Group was established by the Centre for Maternal and Child Health Research in 2013/14 and has fed into major grant applications from the Centre; one service user contributed to the work of *Olander* on midwife–health visitor collaboration and is co-author on two outputs from this research. The involvement of people with aphasia as co-designers, consultants and advisors was recently recognised with an award for PPI to the SUPERB (SUpporting wellbeing through PEeR-Befriending) trial at the 2019 UK Stroke Forum.

Our UOA is also committed to an open research environment. In addition to institutional support for open research such as the University's open access repository, City Research Online, described in REF5a, the School has supported article processing charges for high-quality gold open access publications (£62K over the assessment period to support staff without current research grants or discretionary funds), publication of study protocols (77 since 2014) and making data sources such as interview transcripts available. All submitted staff have an ORCID identifier.

The ethics structure and processes in the SHS have been influential within the University. For example, the Chair of the School Research Ethics Committee (*Drey*) advised the University on implementation of the new online ethics application system. Proportionate Review sub-committees of the School's Ethics Committee have been set up to consider low-risk applications and RCLs are authorised signatories for projects within their respective Centres. This ensures that the approver is already familiar with the research and can rapidly query or request amendments to the application when appropriate. The School was the first at City to institute robust study closure procedures, including secure storage of study materials (both paper and electronic), together with clear recording of destroy dates as appropriate. Induction sessions for all academic and research staff include training in these procedures to ensure that they are embedded across the UOA. These strategies ensure that staff conduct research to the highest standards of ethicality and integrity.

1.3 Research groupings

Our Research Centres reflect the scale, breadth and multidisciplinary nature of our work. They focus on research group meetings, seminar series and creating a research culture for staff and students within the Centre. Other activities are handled at School level to ensure consistency of approach, such as towards research training, research and funding opportunities, and research mentorship.

N.B. Researchers can belong to more than one Centre; their primary affiliation is shown in ***bold****. The RCL is underlined. *Denotes an ECR as of 31st July 2020*.

Centre for Applied Vision Research

Lawrenson, Barbur, Binns, Callaghan, Campbell, Crabb, Ctori, Douglas, Grant, Hull, Huntjens, Jones,* Morgan, Powner, Rodriguez-Carmona, Shah, Solomon, Subramanian, Suttle, Taylor,* Tyler (16.2 FTE)

The Centre has an established reputation in visual psychophysics and neuroscience, improved methods for early detection of eye disease, novel approaches for assessing patient outcomes and systematic reviews within eye care. Members of the Centre have attracted funds to City of £3.6M since 2014. We continue to recruit the next generation of vision scientists, both clinical and basic: *Callaghan, Campbell, Ctori, Jones, Powner, Taylor* – all ECRs when appointed.

Achievements during the REF 2021 assessment period include: development of an automated patient risk analysis module for glaucoma (*Crabb* with Medisoft); the acceptance of the Colour Assessment and Diagnosis (CAD) test as the approved method for colour vision assessment for occupations including train drivers, pilots and electrical contractors (*Barbur*); and the establishment of the first 'Cochrane Eyes and Vision (CEV) Center for Evidence-based Vision Care' in the UK at City, under the leadership of *Lawrenson*.

Future Strategy: (i) Establishing the CAD test as an internationally accepted standard for occupational colour vision assessment; (ii) expanding work on the use of technology for home monitoring of eye conditions, building on Eyecatcher, a tablet-based visual field test; and (iii) contributing to Cochrane evidence that will inform decision-making in eye care globally.

Centre for Health Services Research

Aitken, Abdurakman, Ahmad, Anderson, Bogosian, Bradley, Cartwright, Castro-Sanchez, Cooper, Curtis-Tyler, Davies,* Drey, Dyson, Eriksson, Giorgakoudi, Harden, Hirani, Hoe, Hurt, Llahana, Malamateniou, McCourt, McGraw, McKeown, Mills, Mulligan, Newman, Purssell, Stavropoulou (22.69 FTE)

The Centre for Health Services Research focuses on the implementation and evaluation of health and social care services to improve patient outcomes in the UK and internationally, with Centre staff collaborating with research groups in the UK, Europe, Canada, USA and Australia. Members of the Centre have attracted funds to City of £4.8M since 2014. The Centre has addressed patient experience with, and recovery from, a wide range of health conditions.

Achievements since REF 2014 include: examination of the effect on health of the 2008 financial crisis in Europe (*Stavropoulou*); identification of practices that improve health status in a range of countries and settings (*Mills, Parmar*); examination of the social context of illness and health (*Cooper, Curtis-Tyler*); exploration of the effects of chronic diseases and/or therapeutic interventions on recovery in acute and chronic diseases (*Aitken, Cartwright, Hirani, Hurt, Mulligan, Newman*); and understanding clinician behaviour and identifying techniques to change that behaviour (*Francis*).

Future Strategy: (i) Strengthening the synergies between research groups within the Centre to increase the relevance, reach and impact of our research by expanding the opportunities for collaborative design, planning and development; (ii) expanding the development of interventions that build on the intersections between physical and psychosocial elements of health; and (iii) improving interdisciplinary links with healthcare partners to boost the translational aspects of our work.

Centre for Language and Communication Science Research

Henry, Hilari, Behn,* Botting, Camilleri, Chiat, Cruice, Dipper, Herman, Holland, Litosseliti, Marshall, G Morgan, Northcott, Roper,* Verhoeven, Woolf (14.2 FTE)

Leading-edge research into all aspects of speech, language and communication, including communication disorders, is carried out within the Centre for Language and Communication Science Research. Since 2014, the Centre has generated £3M of research funding to City from major funders, including the Economic and Social Research Council (ESRC), Engineering and Physical Sciences Research Council (EPSRC), EU, National Institute for Health Research (NIHR), Nuffield Health, The Leverhulme Trust, The Dunhill Medical Trust, The Stroke Association and the Baily Thomas Charitable Fund. The Centre is unique in having its own in-house research clinic, the Roberta Williams Speech and Language Therapy centre, which boasts state-of-the-art facilities. The Centre is home to the world-leading Aphasia Research Clinic (*Cruice, Dipper, Hilari, Holland, Marshall, Roper, Woolf*), which conducts innovative, technology-based and translational

research into acquired communication disorders utilising assessment tools that are used in clinical practice.

Achievements during the REF 2021 assessment period include: development of novel assessment, diagnostic and outcome measures for people with developmental and acquired communication disorders and deafness (*Chiat, Herman, Hilari*); novel discoveries about the interplay between language and high-level cognition, and theoretical advances into the understanding of how language affects cognitive development (*Botting, Chiat, Henry, Herman, G Morgan*); and innovative interventions to improve language, communication and quality of life in adults affected by aphasia and children with developmental language disorder (DLD) (*Behn, Cruice, Dipper, Henry, Herman, Hilari, Marshall, Woolf*) using new tools and neuroimaging techniques to study speech and language production (*Holland, Verhoeven*).

Future Strategy: (i) Creating a multimodal assessment and intervention knowledge transfer hub to facilitate implementation of research findings into clinical practice; (ii) developing a virtual international centre of excellence for research into aphasia; and (iii) expanding interdisciplinary links with City Law School to offer new training and continuing professional development for criminal justice professionals.

Centre for Maternal and Child Health Research

McCourt, Ayers, Bradley,* Chudleigh, Coates,* Curtis-Tyler, Kay, Lee, Macfarlane, Olander, Rocca-Ihenacho, Salmon, Scamell (12.1 FTE)

The Centre for Maternal and Child Health carries out leading research on models of care (*McCourt, Macfarlane*), perinatal mental health (*Ayers, Coates, Lee*), and public health, diversity and inequalities (*Curtis-Tyler, Olander, Salmon*). Cross-cutting themes include global maternal and child health (*Bradley*) and implementation science in complex interventions (*Rocca-Ihenacho*). Members of the Centre work with researchers in Europe, South America, Africa, Australia and India. We also have strong links with professional, voluntary and service-user organisations such as the National Childbirth Trust, Royal College of Midwives (RCM) and Which? Birthchoice. Members of the Centre have founded and hosted key networks such as the European Midwifery-Unit Network and the International Network for Perinatal PTSD Research. Since 2014, Centre members have achieved grant income to City of £2.7M.

Achievements since REF 2014 include: (i) expansion of midwifery-led units into Europe and beyond based on our body of research in this area; (ii) development of a range of research tools and empirical studies to assess perinatal wellbeing; (iii) epidemiological studies on female genital mutilation (FGM); and (iv) a programme of work on improving equity of care for migrant and disadvantaged women in the UK and internationally.

Future Strategy: Over the next five years we will expand work addressing quality and equity of maternal and child healthcare globally, addressing subjects as diverse as perinatal mental health, sexual health, FGM, health system stewardship, midwifery-led care models and respectful care.

Centre for Mental Health Research

McCabe, Ayers, Barlow, Barnicott, Cartwright, Chudleigh, Coates, Gillard, Haddad, Hoe, Jarrett, Lavelle, Llahana, Lucas,* McManus, Mills, Mulligan, Olander, Philips, Sin (11.6 FTE)

The Centre has an international reputation for co-produced research with young people and adults (including older adults) with mental health problems in national and global settings. Our work focuses on improving patient access, experiences and outcomes through novel methods, psychosocial interventions and models of care. This includes work on communication and therapeutic relationships, recovery-focused care planning, trauma-informed care, peer support, eHealth interventions and psychosocial interventions for vulnerable populations (psychosis, dementia, people who self-harm at risk of suicide, refugees). We use innovative methods, including: conversation analysis and natural language processing to study communication (*McCabe*); body-worn cameras to analyse management of aggression on inpatient wards (*Lavelle*); risk assessment in dementia (*Hoe*); participatory research methodology to co-design eHealth (*Sin*); peer support interventions (*Gillard*); and sandboxing to explore interpersonal relationships (*Lucas*). We collaborate with colleagues in the Centre for Maternal and Child Health

Research (*Ayers, Coates*: perinatal mental health) and Health Services Research (*Cartwright, Mulligan*: physical and mental health). The Centre employs service-user researchers as faculty, and our award-winning SUGAR group has been running since 2009. We work alongside clinicians in numerous NHS trusts, professional bodies (e.g. Royal College of Nursing, Royal College of Psychiatrists) and charities (Samaritans, Alzheimer's Society, McPin Foundation). The Centre has generated over £1.2M in competitive research grant income to City since 2014, from funders such as the NIHR, ESRC, the Dunhill Medical Trust and the British Academy. Strategic investment in staff has resulted in increased grant capture (£665K to City since 2019).

Achievements during the REF 2021 period include: global impact on increasing the safety of inpatient wards through evidence on absconding and safe staffing levels (NHS England Sustainable Safer Staffing in Mental Health, 2016/17); increased service-user involvement in recovery-focused care planning in community and inpatient settings, contributing to the integrated primary and community model via The Community Mental Health Framework for Adults and Older Adults; and the NIHR 2020 'Service User and Carer Involvement in Research' award for the 'E-support for Families and Friends of Individuals affected by Psychosis' project.

Future Strategy: Over the next five years we will: extend work in youth, global and public mental health; advance expertise in novel methods to better understand therapeutic processes explaining outcomes in mental healthcare (e.g. computer vision and 3D motion capture to analyse non-verbal communication as an indicator of engagement in care); and develop and evaluate novel co-produced digital, face-to-face and blended media interventions (trauma-informed care, rapid follow-up care for self-harm in the Emergency Department).

1.4 Future strategic aims and goals for research and impact over the next five years

Our research vision is to enhance the health and wellbeing of people in their communities and nations by partnering with users, practitioners and policymakers to deliver research that is innovative, usable and policy-relevant.

We will achieve this by:

A. Carrying out world-leading research into health and wellbeing that is focused on impact in **priority areas** such as mental health, maternal and child health, and the health and wellbeing of older individuals
B. Recruiting, retaining and developing **exceptional staff** who have a strong research trajectory in priority areas and demonstrate outstanding leadership qualities
C. Creating an inclusive and diverse 'academy without walls' by **working across discipline boundaries** and developing and enriching **partnerships** with stakeholders to create new research synergies
D. Activating the **translational pathways** from scientific discovery to public benefit
E. Growing the quality and quantity of research by increasing the number of staff who are awarded competitive research funds (**horizontal growth**) and increasing the average size (and hence, likely quality) of research awards **(vertical growth**).

Over the next five years, we will expand our partnerships with service providers and charities, including the NIHR Applied Research Collaboration (ARC) North Thames, which includes within its region a diverse range of more than six million people. In addition, we will embed partnership working at all phases of the research process to include users, practitioners and policymakers. This will include expanding our pioneering work on co-production in mental health to other areas. We will also continue to invest in research capacity within nursing, building on the appointments of *Aitken, Anderson, Castro-Sanchez, Chudleigh, Gillard, Hoe, Llahana, Purssell, Sin* and *Smith* to further strengthen our methodological expertise and build on our position as first in London for Nursing (Times Good University Guide, 2019 and 2020). This will be supported by increasing clinical academic fellowships and linking our clinical academics more closely with staff who have key methodological expertise. The strongly emerging themes of global public health, technology-enabled care, behaviour change for eye health, and implementation research in acute care and community healthcare settings will be developed. We will also expand our collaborations across City, including with the Interdisciplinary Centre for Healthcare Innovation Research, which addresses the complex challenges of embedding healthcare innovations.

2. People

2.1 Staffing strategy and staff development

We focus on developing and retaining the highest quality researchers and recruiting either early career academics with a strong positive trajectory or senior staff with an outstanding research track record. Since REF 2014, 33 new academic staff have been recruited on a research track, of whom 9 were appointed at Senior Lecturer and 6 at professorial level (*Anderson, Gillard, Harden, McCabe, Salmon, Sin).* This includes 6 internal research staff or students who have competitively progressed to full academic positions with us. Since 2014, 20 academic staff on a research track have been promoted: 12 to Senior Lecturer, 4 to Reader (*Chudleigh, Cruice, Dipper, Hoe*) and 4 to Professor (*Botting, Herman, Hilari, Verhoeven*). Of the 33 newly appointed staff, 21 are clinically registered and offer an understanding of the clinical context of research and/or links with clinical practice and clinical networks.

Academic and research staff are supported in their development through six broad categories of activity: (1) induction and training; (2) mentorship; (3) workload; (4) financial support; (5) promotions; and (6) recruiting and retaining excellent researchers. All new staff receive an induction programme and access to training and development activities run by the Central Research Office (e.g. grant writing workshops). Within-School training includes, for example, statistical support from our in-house statistician and individual support from research support staff and academic colleagues. Research is disseminated at national and international conferences by staff and research students via the School's Travel Committee (£232K allocated during the assessment period, covering 148 national and 204 international conferences in addition to presentations financed through research funding). The School's Training Committee funds staff attending external courses to support research and grants fee waivers for staff PhD candidates (approximately £100K committed since 2016).

Since REF 2014, we have developed a research mentorship scheme. We currently have 28 trained mentors and the ADRE provides training sessions for new mentees. As a result, several staff have achieved their first success leading funding applications. Examples include *Olander* (Senior Lecturer in Maternal and Child Health, leading the behavioural science component of an NIHR Health Services and Delivery Research (HS&DR)-funded project to support new parents as they learn results of newborn screening tests) and *Callaghan* (ECR at the time in Applied Vision, grant successes with the International Glaucoma Association and the Macular Society). Importantly five candidates have been successfully mentored in developing clinical doctoral research fellowship applications, three funded by the NIHR and two by Barts Charity.

Our workload approach incorporates time for research funding applications, publications and impact activities; teaching and other responsibilities are adjusted in light of these commitments. ECRs are allocated more research time to allow them to develop a research profile that supports larger grant applications. Sabbatical leave also supports staff in their research development. Revised guidance has led to an increase in approvals at all grades, with 12 staff approved for sabbatical leave since 2016. Examples of outputs from sabbaticals include: significant grant income (*Francis*; £2.72M to City); world-leading publications (*Ayers*; five outputs in high impact factor journals); working at top institutions (*Huntjens*; University of California, Berkeley); and mentorship of others (*Cruice*; supported funding applications submitted by four ECRs).

Financial support for staff is provided by the School's Research Sustainability Fund (RSF) in addition to travel and training budgets. The RSF is used strategically for research sustainability and development, distributing circa £250K per year. It provides: bridging funds for retaining talented postdoctoral fellows; postdoctoral fellowships to support research staff who show promise as independent researchers; doctoral studentships; 'progress awards' for successful PhD students, which provide six months' funding to maximise outputs and support postdoctoral applications; and article processing fees to support publication in open access journals. These initiatives provide tremendous opportunities and encouragement for research students and staff to build their CVs, strengthening their opportunities for advancement. One example illustrates the benefits of this investment: *Northcott* received a one-year postdoctoral fellowship funded by the RSF in 2015/16. The award supported publications and applications for funding, which led to a

Stroke Association Jack Bradley and Averil Mansfield Fellowship Award. This was completed in 2020 and Northcott is now a Senior Lecturer.

The School has developed an Academic Promotions Framework that supports career development through promotion. The framework specifies the quality and quantity of research (papers, grant income, PhD student supervision, etc.) expected at different levels. This has allowed staff to be strategic with their own personal research plans, assessed through annual and interim appraisals, and aligned with the overall School research strategy. There is good evidence that our staffing strategy is sustainable; we are submitting 14 staff who completed their doctoral studies at City, and of this group five have been promoted to Professor.

Additional practices to support research staff in line with the Vitæ *Researcher Development Concordat* have been initiated specifically in areas related to recruiting and retaining excellent researchers, recognising and valuing researchers, prioritising diversity and equality in recruitment, and career management and financial support. Since REF 2014 we have attracted 39 high-calibre researchers to postdoctoral Research Fellow or Senior Research Fellow posts, mostly working on externally funded projects. A further 19 research staff have been recruited to specialist roles (statisticians, programmers, trial managers, health economists, clinical researchers). These staff have increased our research capacity by expanding the diversity and skill base, thus contributing to research excellence. For example, much of the research and impact by *Barbur* relies on novel, computer-based vision tests supported by research programmers. All research-only staff have access to the same support and development activities available to academic staff and additionally to dedicated career development workshops. Formal training (including modules in academic practice for higher education) allows research staff to expand their academic skills. For example, they receive additional mentoring from an experienced academic if they wish to gain experience in teaching or co-supervising postgraduate research projects. Research staff also have access to some of the funds and support offered to academic staff: *Jones*, a research assistant in the Crabb Lab, received enterprise funding from the Research and Enterprise Office to develop a smartphone virtual reality app that simulates visual impairment caused by different eye diseases. Master classes for research fellows, focusing on career development (led by *G Morgan*), encourage research staff to take a long-term view of their career path and help them decide whether the academic route is appropriate for them. Following one series of workshops, two postdoctoral Research Fellows (*Behn* and *Barlow*) were appointed to the post of Lecturer and have now progressed to Senior Lecturer level.

The culture of staff development is exemplified by staff satisfaction surveys, which have indicated that 85% of our staff value the clarity of their work objectives and 82% enjoy working in the School.

2.2 Research students

We strongly support research students with opportunities to progress and succeed, including developing research skills, dissemination, building their publication profile, and connecting with their discipline and with wider research communities nationally and internationally. Between 2014 and 2020, 117 students completed a doctoral degree (115.36 accounting for cross UOA studentships). In addition, 119 students completed MPhil or MRes research degrees. Of the 80 current PhD students, 19 are fully or partially supported by internal funding and 13 by externally funded fellowships/studentships, including NIHR clinical doctoral fellowships (3) and other sources such as charities and industry. Thirty-one students are self-funding and 11 matched-funded studentships were initiated during the assessment period with NHS trusts, industry and charities. This not only enabled more students to be supported but also enhanced the relevance and impact of the research through collaboration with organisations that will use the research (details in Section 3 below).

Our students have high levels of achievement and satisfaction:

- Doctoral graduates who completed within the assessment period have published 181 lead-author papers that have been cited 2,144 times (Scopus). Eighteen graduates have achieved more than 50 citations.
- In the national Postgraduate Research Experience Survey, doctoral research students have provided very positive feedback on their experience of supervision. For example, in

2017 (response rate 77%), 100% of responders reported that *"My supervisor/s have the skills and subject knowledge to support my research"* and *"My supervisor/s provide feedback that helps me direct my research activities*."

There is strong independent evidence of the quality of our doctoral graduates from destination data. Thirty per cent of our PhD students who completed within the assessment period have gained their first academic appointment, with 26% taking up postdoctoral research positions. Several of our most talented PhD graduates have been appointed to the School's academic staff: *Ctori* (Optometry & Visual Science, appointed 2015), *Taylor* (Optometry & Visual Science, 2019), *Walker* (Midwifery, 2014), *Rocca-Ihenacho* (Midwifery, 2015), *Behn* (Language and Communication Science, 2018) and *Jones* (Optometry & Visual Science, 2019). Others have taken up positions at high-calibre institutions in the UK and overseas, including the University of Birmingham, King's College London, the London School of Hygiene and Tropical Medicine, University College London (UCL), Aarhus University, the University of Hannover and the University of Pennsylvania. Most of the remainder have joined industry or taken on roles with non-governmental (NGO) or government organisations.

Our research programmes also contribute to the development of the clinical workforce. Twenty per cent of our PhD graduates have taken their research skills back into clinical practice; between 2014 and 2020, 116 midwives, speech and language therapists, occupational therapists, physiotherapists and dieticians from 19 different NHS trusts in London, Oxford and Cambridge completed our Masters in Clinical Research programme. Since 2015, finishing students from this programme have been invited to a researcher development day to discuss their next steps and devise concrete actions to achieve their research career aims. Graduates often link their success on the MRes programme to subsequent career development and promotion. To support advancement to doctoral level, the School was successful in 2018/19 in securing funding from the NIHR and Health Education England for the doctoral bridging scheme. This has enabled MRes graduates to return to City one day a week for up to 12 months. For example, *Curtin* (Language and Communication Science) joined the bridging programme following her NIHR-funded MRes in 2018; in 2019 she successfully applied for an NIHR clinical doctoral fellowship, which she commenced in May 2020.

A number of structures and processes underpin this success. We offer three levels of mentorship for research students. First, the supervisory team are the initial mentors, advising on issues within the disciplines, networks, dissemination, career opportunities and options, and introducing students to their own national and international networks. Second, Senior Tutors for Research (STRs) provide additional support and independent advice when needed. Third, RCLs are available to offer senior-level advice and mentoring as required. We have improved peer support through co-locating research students in a dedicated area in the Health Sciences building as described in Section 3. The progress of all doctoral students is monitored using the online system, Research-and-Progress (RaP), which has recently changed to Haplo PhD Manager following a competitive tendering process. These systems facilitate record keeping, including notes from supervision meetings, supervisors' comments and storing of important documents. RaP highlights key milestones (e.g. annual review meetings, MPhil-to-PhD upgrade) and registers when these have been completed satisfactorily. STRs within each Research Centre provide oversight of progress through these milestones, independently of the supervision team. The STRs are members of the Research Degrees Programme Committee, chaired by the Programme Director (*Cruice*). This committee has a key role in quality monitoring and improvement of the research programmes, including processing applications, training and allocating supervisors, identifying students whose progress indicates a need for additional support, managing upgrade and final examination procedures, and, importantly, serving as a point of contact for students facing difficulties that they feel they cannot discuss with their own supervisors. Significant actions since REF 2014 include tightening of the timeline and procedures for upgrade, which has resulted in earlier feedback to the student if they are doing well or need more support. The Professional Doctorate in Health Psychology programme is additionally subject to the scrutiny of the Health and Care Professions Council, which regularly monitors programme quality, including staff resources, workshop content and appropriateness for developing the required professional competencies.

To support their development, research students are all expected to engage actively with their research team, Research Centre and the School. This includes research group meetings; research 'show and tell' events (externally focused); Research Centre conferences; and our Annual Doctoral Student Conference, at which all research students present their research-in-progress while being exposed to all aspects of an academic conference. They are also eligible to enrol, free of charge, in any Masters-level module and training workshops provided by the University (see REF5a) to address knowledge gaps. The most commonly attended modules are in research methods and applied data analysis and learning, and teaching and assessment. The latter leads to the Introductory Certificate in Academic Practice and is required before PhD students can teach and convey their clinical/research knowledge to taught students. DPsych students participate in monthly all-day workshops during the first year of their candidature and a regular series of seminars in medical statistics is run by our in-house statistician.

In recent years we have expanded the centralised training available to research students, including open scholarship and General Data Protection Regulation (EU) 2016/679 (GDPR) as examples. The new City Doctoral College has recently brought together PhD student training opportunities across the institution, where appropriate, as described in REF5a. In addition, the Research Degrees Programme Committee within the SHS is currently co-designing a new training programme for research students in the School to run alongside the University-wide training. This will lead to a suite of training opportunities specific to students in this UOA that is layered on top of more widely available generic training.

2.3 Equality and diversity

We are fully committed to ensuring equality of opportunity for all via the development of strong and targeted policies, procedures and support networks, the active engagement of our staff in relevant training, and the provision of appropriate and accessible physical infrastructure.

Staff are recognised as central to the School Strategic Plan, which embodies our inclusive approach to all staff and students. We support flexible working and flexible contracts; 30% of our academic staff are part-time and of this number 21% are female. Contract variations support staff at different points of their career and when external commitments vary; part-time staff can also adjust their working hours to match their other commitments. Our promotions process recognises part-time staff by allowing for a reduced volume of activity without changing the quality benchmark; 23% of promotions within the assessment period went to part-time staff, a figure that is approaching the percentage of part-time academic staff in the School (30%). There is also a diverse range of research students (24% part-time) and a high proportion of female students (79%). We support our students by giving access to the facilities and support available to all staff, including choice of IT provision, flexible working and maternity pay. City has well-developed support services that cater for its diverse student body and are also accessible by our research students.

We have made significant progress on gender equality since REF 2014. The SHS was the first school at City to gain an Athena Swan Bronze award in 2018 and we aim to apply for silver status in November 2022. During 2014–2019, seven out of eight promotions to Reader or above went to female staff, including part-time staff. This has helped bring the gender balance of senior academic staff (Reader and above; F/M 61%/39%) closer to the whole School figure (F/M 66%/34%). Workshops are held annually to support staff wishing to apply for promotion to Senior Lecturer, Reader or Professor, and individual mentoring is offered to advise on applications and address equality and diversity questions.

In addition to the key initiatives described in Section 2.1, we continue to encourage diversity through our staff recruitment policies and training. Equality and diversity monitoring by the leadership team is coupled with a clear expectation that staff undertake training in inclusive leadership, unconscious bias and being an active bystander.

LGBTQ+ individuals and groups are supported through university-wide LGBTQ+ student and staff networks, a Harassment Adviser network and effective University Transgender and Gender Nonconforming policies and guidelines; we are one of only a handful of UK universities with such detailed policy and guidance. Several of our highly respected LGBTQ+ staff hold significant

positions of responsibility (16 of our academic staff [10.1%] declare LGBTQ+ status) and can therefore be seen as role models.

Fourteen of our academic staff (8.8%) declare a disability, including disability associated with mobility. Staff and research students in the UOA are housed in the Health Sciences building, which has wheelchair access, automatically opening doors and disabled toilet facilities on each level. The Disability Confident scheme is available for all applicants.

Of special note for equality and diversity in this UOA is the role of health service user, PPI and stakeholder panels that are embedded in each Research Centre. The panels are themselves case studies in diversity. For example, the Centre for Mental Health Research has an award-winning collaborative partnership with SUGAR, which consists of 15 people in total; 12 with lived experience of mental illness/distress and service use and 3 carers of people with mental illness. We provide 'research literacy' training to SUGAR panel members, who report increased confidence in contributing to research and that the training has been transformative in terms of their skills, relationships and career opportunities.

Although we have made significant progress on equality and diversity, this is a constant work-in-progress and our ambition is to continue to support all researchers so that protected characteristics are no barrier to carrying out high-quality research or career progression.

3. Income, infrastructure and facilities

3.1 Research income

Research income increased by 16% from £13.49M (REF 2014) to £15.59M in the current assessment period, and the total grant income awarded per year has risen from £1.86M (2013/14) to £2.69M (2019/20). Since 2016, staff in the UOA have led on successful grants totalling £18M. We have also grown funding from specific funders in line with our strategy, including the NIHR, charities and industry. NIHR income has increased from £3.38M to £5.80M over the assessment period and research income from charities and industry has also increased (£0.82M to £4.97M and £0.05M to £1.13M, respectively). Significant examples include: *Marshall, Hilari* and their teams in the Centre for Language and Communication Sciences with the Stroke Association for research on aphasia (value to City £1.01M); *Newman* with East London NHS Foundation Trust for work on the management of long-term conditions (£512K); *Crabb* with industry partners for ophthalmic research (total value £989K); and three PhD studentships match-funded by the Worshipful Company of Saddlers who focused their grants on activities that would produce public benefit across the breadth of society. Active projects as of 31st December 2020 are supported by award totals of £9M from the NIHR, £6.7M from charities, £3M from UK research councils, £1.5M from government, NHS trusts and local authorities, £1.5M from the EU and £300K from industry.

This growth in research income is associated with strategies put in place since REF 2014. In addition to the six key areas of support for staff detailed in Section 2.1, several specific strategies are directly linked to grant generation. Our internal peer review system, which applies to all staff, supports the development of grant-writing skills alongside grant application training workshops (twice yearly). Junior academics benefit from peer review by senior staff and are often matched to those who have had a successful experience with the funder. Contributions of our staff to funding panels (described in Section 4 below) helped us establish a reputation with the NIHR, charities and industry, including City of London Livery Companies. Pump-prime funding is available for ECRs who have exciting but high-risk research ideas that require feasibility data or developmental work before they can apply to external funders. Although provided centrally, the School proactively supports staff through this process, with internal peer review within their Research Centres and mentorship from the ADRE. As a result, 33 academic and research staff in this UOA won competitive pump-priming awards during the assessment period (value £157K). One example, among many, is a clinical academic who used pump-prime funding to support the analysis of hospital guidance documents on the detection and management of deteriorating patients using behavioural models; the results led to a successful NIHR Clinical Doctoral Fellowship application (2018–2022; £350K).

The School invests in public engagement events and consultations to ensure that research proposals reflect issues and outcomes of importance to stakeholders. For example, the Colour in

Health and Employment Symposia, run in 2018 and 2019, provided important practitioner input to our submitted impact case study on colour vision testing in safety-critical environments (*Barbur*). In the field of language and communication in school settings (*Herman, Roy*), City runs showcase events, workshops and discussions. We continue to host many PPI events both to inform our research agenda and to disseminate findings, notably for the SUGAR group as described in Section 1.2 above and as part of clinical projects such as the CommuniCATE project for aphasia.

Our strategy of increasing international partnerships (further details in Section 4.1) also supports research income generation. We are expanding these through mentorship, collaboration between staff in the School and strategic funding support during project development. Research income involving international collaborators totalled £3M to City during the assessment period. Recent examples include: collaborative grant awards to research groups in ophthalmic public health (£596K to *Lawrenson*, with Ivers, Toronto and Grimshaw, Ottawa); adolescents with intellectual disabilities (£102K to *Henry*, with Poloczek, Frankfurt, Germany and Danielsson, Linköping, Sweden); and management of psychosis in low-income countries (£130K to *McCabe*, with Jankovic, Queen Mary University of London [UoL] and psychiatry teams in Serbia, Croatia, Montenegro and Kosovo).

3.2 Investments in facilities and infrastructure

We have made significant investments in facilities and infrastructure. In REF 2014, we described visionary plans for co-location of all staff in the UOA in one building to facilitate collaboration and efficient management. The building changes, completed in 2016, resulted in the School moving from nine separate sites to just two (total investment £7.37M). All staff and PhD students in the UOA are now accommodated in an open-plan environment within the refurbished, secure Health Sciences Building. The building acts as a hub for staff, with break-out areas for large gatherings, and board, seminar and meeting rooms with computerised presentation and video-conferencing facilities. These are supported by the University's large IT support team. A second site, at the heart of the main university campus, houses three kinds of specialist research and impact facilities: (1) bespoke research laboratories for basic and applied research; (2) simulation suites for research into clinical skills, telemedicine and radiography; and (3) public-facing clinics in Speech/Language Therapy and Optometry, which are a major focus of research-into-practice activities.

The research laboratories within the Centre for Applied Vision Research include biological sciences facilities that house equipment for the production and evaluation of histological sections (ultramicrotomes, cryostat, vibratome, light microscopes and image analysis suite); a tissue culture laboratory; a specialist husbandry system for housing amphibia; specialist eye movement equipment; a molecular biology/biochemical laboratory; and facilities to conduct experiments using fish, chick embryo and *Drosophila* models. The Centre also has well-equipped optical, psychophysics, electrodiagnostic, eye movement and clinical vision science labs. The Centre for Language and Communication Science Research has a specialist phonetics laboratory, with equipment largely supported by industry (£135K investment), which has underpinned some 22 publications during the REF period. Our simulation suites include City TECS, which was opened in 2015 following an investment of £331K. It is a purpose-built suite that houses some of the latest telehealth and telecare equipment (supported by companies Philips and Tunstall) and is used for research and skill development among students. In addition, we have initiated a VERT (Virtual Environment of a Radiotherapy Treatment) laboratory for radiography research. All of these research laboratories, simulation suites and clinics occupy 1,396 m^2 of space and represent an investment of £6.03M. The public-facing clinics include a 23-cubicle optometry clinic, *City Sight*, which has approximately 4,500 patients every year. *City Sight* supports clinical research by providing state-of-the-art facilities and a large patient base plus infrastructure to handle participants in clinical research. The Roberta Williams Centre runs specialist clinics in speech and language therapy often linked to clinical trials. These include the aphasia research clinic and the CommuniCATE clinic. These facilities, officially opened in the spring of 2016, occupy 869m^2 of space at the main University campus and were the result of an investment of £3.28M.

The increase in our research income partly stems from the University's enhanced investment in research infrastructure. The central Research Office has been completely restructured and

expanded. Efficiencies and benefits of centralised management are balanced by maintaining UOA-specific research support staff within the School to ensure that pre-award support remains personalised, responsive and specialised. Two further research support staff provide post-award support (in collaboration with the University's Finance Team) and support for the School Ethics Committee and its sub-committees, our research output quality monitoring system and research committees within the School. Two major developments in support infrastructure are the introduction of the online grant management system, Worktribe, and the online system REO (Research Ethics Online). The SHS has led much of the ethics work at City, including developing proportionate review committees, chairing the Senate Ethics Committee (*Douglas*) and pioneering specialist areas such as research with children and vulnerable adults, and animal research (*Drey*). Our lead statistician provides in-house training in statistical techniques to staff and research students. A full-time Business Development Manager works with the central Research and Enterprise Office and Commercialisation team to support the impact of our research on the industry, education and charity sectors. For example, the spin-out company City Occupational Ltd (*Barbur*) is a joint venture with Visicomp Research Ltd that develops and markets Advanced Vision and Optometric Tests. These computer-based vision tests have applications in occupational medicine, public health and applied vision research. Specialist support is provided centrally in certain areas, e.g. EU grant applications. Individual staff in the University's Finance Office are allocated to this UOA to support project management.

We have developed specialist support tailored to all research and impact activities for nursing and allied health research. The ADRE chairs the School's Research Committee, which is responsible for the School's research culture, strategic development and the promotion of research leadership. The ADRE also chairs: the RSF Committee (managing the discretionary research budget of approximately £250K per year); the Impact Leads Working Group; and the Travel/Conference Committee (approximately £40K per year). Committees with budgetary responsibility work with documented terms of reference and report to the Research Committee and School Finance Committee to ensure that funding decisions are transparent, criteria-based and fair. The ADRE additionally controls a Strategic Development Fund that can be rapidly deployed to support specific needs of researchers (e.g. funding short-term additional administrative support for principal investigators who are developing large-scale grant applications). The School has a team of two (FTE) professional services staff to support research students. The University provides information science support from specialist librarians (e.g. for developing systematic review protocols), technical support and data storage, and data security and compliance support (e.g. GDPR). We fitted out a bespoke Archive Room in the Health Sciences Building for locked storage of documents from completed research projects, labelled with clear 'destroy dates' to ensure future compliance.

Investment in infrastructure and facilities has supported the creation of internationally significant impact, described in our impact case studies, as well as other noteworthy impact, including: *Newman* and *Hirani's* TECS (Technology Enabled Care Studio), where the learning processes of students and practitioners across disciplines can be investigated through simulated learning; *Olander's* COPE project (COllaborating in Pregnancy and Early years), which investigated the most effective ways to support midwives and health visitors to work in partnership when delivering maternity services; *Hull's* work on designing, developing and evaluating the optical cylinder used in visual rehabilitation of people who are blind and have end-stage corneal disease; and *G Morgan's* study of music training for deaf people to enhance executive function.

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

4.1 Collaborations with researchers in other UOAs, other higher education institutions and other nations

All of our Research Centres have strong international collaborations, allowing our research to have influence at a global level. Productive collaborations exist with almost all countries in Europe and in addition Australia, Brazil, Cameroon, India, Japan, New Zealand, Singapore, South Africa, Tanzania and the USA. *Crabb's* links with European collaborators have led to three EU-funded projects (over €1.5M to City). The projects address major issues in eye care, including more effective tests for age-related macular degeneration (AMD), glaucoma screening and improving

functional vision. The European Commission is also funding a consortium of partners from Europe and Africa, led by *McCourt*, which is researching optimal care for women during their first 1,000 days postpartum. Many other staff in the UOA have strong links to European universities. Examples include: the Thales-Aphasia project with the University of Athens, Greece (*Hilari*); work with the Centre for Resilience in Healthcare at the University of Stavanger, Norway (*Anderson*); psychosocial interventions for perinatal post-traumatic stress disorder (PTSD) with the University of Lausanne, Switzerland (*Ayers, Sin*); and predictors of reading in intellectual disability with Linköping University, Sweden (*Henry*). Importantly, junior staff members are also developing successful international partnerships, including: a project funded by NIHR Research for Patient Benefit (RfPB) and being run in conjunction with Vrie Universiteit Amsterdam and Erasmus University Rotterdam, the Netherlands, which is studying how video feedback can help parents with personality disorder interact with their infants (*Barnicott*); work on schizophrenia with the University of Gothenburg, Sweden (*Lavelle*); and a collaboration on health in pregnancy with the University of Valencia, Spain (*Castro-Sanchez*).

Global collaborations are also significant. Work within the Centre for Maternal and Child Health led to an alliance with Fundacio Oswaldo Cruz, Brazil (*McCourt, Ayers, Coates*) on maternal health, including current funded work (Newton Fund) on post-partum mental health. *Lawrenson* (Applied Vision) has led on two large NIHR projects on diabetic eye disease with collaborators at the Universities of Ottawa and Toronto, Canada (£759K to City), and a team of ten academics, also from Applied Vision and led by *Subramanian*, has established a strong collaboration with the LV Prasad Eye Institute, Hyderabad, India. The latter, pump primed by a competitively awarded Global Challenges Research Fund (GCRF) grant, has resulted in five PhD students registered at City and co-supervised in India, with projects spanning from visual science to public health. Links with the USA include universities, government organisations, hospitals and industry. For example, *Barbur's* research, which has underpinned the development of the CAD test, is used in collaborative gene therapy trials in university hospitals in Wisconsin, Philadelphia and Oregon. *Aitken,* a world-leading academic on sedation in critical care, is a member of the Sedation Consortium, which is part of ACTTION, a public–private partnership with the US Food and Drug Administration (FDA), and *Stavropoulou* has published highly cited work within the field of health economics with Ioannidis (Stanford). Public health research partnerships are running in South Africa, India and Rwanda on antimicrobial resistance (*Ahmad, Castro-Sanchez*) and a collaborative project funded by the US National Institutes of Health on clean fuel is ongoing in Cameroon (*Cooper*). Further productive links have been forged with Singapore, Japan, New Zealand, Australia, Hong Kong and Tanzania. The extent and productivity of these networks demonstrate the reach and significance of our research. Significant growth amongst our junior staff is important for the future expansion of our research agenda.

Most staff in the UOA have collaborations with researchers at other universities in the UK that are productive and often long-standing. Forty-two per cent of grants awarded since REF 14 involve external national and local partners. For example, *Ayers* and *Coates* (Maternal and Child Health) lead on part of the NIHR-funded MAP (Methods for Assessing Perinatal anxiety) project with the Universities of Oxford, Stirling and York, and *Ayers* additionally works with the University of Nottingham clinical trials unit on NIHR-funded projects connected to perinatal health. *Botting* (Language and Communication Science) has a long-standing collaboration with the University of Manchester on DLD and is also involved in a major project to bring together families and policymakers, including creating a participant database, for those with DLD involving the Universities of Bath and Cambridge. In the Centre for Applied Vision Research, *Douglas* collaborates with the Universities of Bristol, Liverpool, Manchester and Oxford, and UCL, on studies into the mechanisms of vision that have resulted in high-profile outputs in journals such as *Proceedings of the Royal Society*. *Subramanian*, a clinical academic, works on funded projects with the University of Manchester on low vision. Several members of the Centre for Health Services Research have extensive collaborations, such as *Newman's* wide-ranging work in health psychology in collaboration with the Universities of East Anglia and Oxford, UCL, Imperial College London and Queen Mary UoL. Recent appointments *Ahmad* and *Castro-Sanchez*, also based in Health Services, both work on funded programmes with the Health Protection Research Unit at Imperial. The Centre for Mental Health Research has links with the School of Community Psychiatry at Queen Mary UoL (*McCabe* and *Gillard*), and in addition *McCabe* is part of successful

funded projects with Exeter, Manchester and Warwick Universities and King's. ECR *Barnicott* collaborates with Cambridge University and Imperial on an NIHR RfPB grant looking at video feedback for parents with personality disorders in order to improve their interaction with their children. In listing these examples we have included staff at all grades from Lecturer to Chair.

Interdisciplinary working across UOAs at City includes: law (*Henry's* work on the training and use of Registered Intermediaries in the criminal justice system); psychology (*Solomon* on £477K BBSRC-funded project on expert anticipatory advantage in sports decision-making; *Botting* on autism); City Business School (*Meyer* and *Hoe* on the £1M EPSRC-funded SCAMPI [Self-Care Advice, Monitoring, Planning and Intervention] project and *Giorgakoudi* and *Stavropoulou* providing health economic expertise for grants on healthcare innovation); computer science (*Cruice, Hilari* and *Marshall* on projects investigating the use of technology in aphasia, with funding from The Stroke Association, The Tavistock Trust and EPSRC to a value of £1.32M); and engineering (*Barbur* and *Hull* on a novel contact lens for intraocular pressure measurement that incorporates a fibre optic sensor, funded by the Royal Academy of Engineering, and *Powner* on optical neurostimulation).

Collaborations with NHS, industry and government agencies are fundamental to the research carried out in the UOA. Many of the projects cited above also include NHS trust partners. Service-level collaborators include NHS Blood & Transplant (partner on £2M NIHR-funded AFFINITIE programme grant to improve blood transfusion practice, with Canadian co-investigators); several studies covering AMD and diabetic eye disease with Moorfields Eye Hospital (£710K); social care partners (numerous care homes) collaborating with My Home Life research; collaboration on improving the outcomes of cataract surgery (*Hull*) with Guy's and St Thomas' NHS Trust, funded by Alcon and Rayner Intraocular Lenses Ltd (total value £461K); EC-funded (€4.5M; *McCabe*) IMPULSE project on management of psychosis in low- and middle-income European countries, with psychiatrists at Queen Mary UoL; UK Glaucoma Treatment Study (*Crabb*) with a national network of ten NHS trusts across the UK; and the Aphasia Team (*Marshall, Hilari*) with the Royal Free and Barts NHS Trusts. In addition to the funding examples above and those mentioned in Section 3.1, links include *Newman* with Philips Healthcare for technology-enabled care, the Aphasia Team with many third sector organisations, such as Speakeasy and Dyscover, and *Crabb* with pharmaceutical manufacturers Novartis and Roche for work on AMD treatments and sight loss (over £800K in unrestricted grants).

The School is a member of UCL Partners and the North Thames ARC (value £9M), which is a continuation of the highly successful North Thames CLAHRC (Collaboration for Leadership in Applied Health Research and Care). *Harden* was key investigator and theme lead for child and adolescent health between 2014 and 2019. We also work with government agencies to develop impact from our work. For example, *Lawrenson* led on the update of two Cochrane reviews that were prioritised during the development of National Institute for Health and Care Excellence (NICE) guidelines on the management of AMD; the results have been used by NHS England in their guidance for Clinical Commissioning Groups.

4.2 Indicators of wider influence

Our staff influence government policy and professional guidelines. Examples outside our impact cases include *Botting*, who is Co-Principal Investigator on the UK's largest and longest cohort study of DLD, which informs many policies and guidelines at national and international level. These include: government documentation (Department for Education UK; Unit 13 for SLCN [Speech, Language and Communication Needs] in secondary school pupils, 2012); Better Communication.org documentation – UK Government, 2016); and the policies and manuals of the Royal College of Speech and Language Therapists (NICE guidelines [2018]). Her research is also cited in international guidelines such as those from: Speech Pathology Australia (Clinical Guidelines for Speech Pathology and Mental Health Services, 2010); US Department of Health and Human Services, Agency for Healthcare Research and Quality (Evidence synthesis on screening for SL difficulties, 2014); and the Ontario Association of Speech Language Pathologists and Audiologists.

Simpson, as National Advisor, helped develop the national Framework for Community Mental Health Care in England, launched to support the NHS Long-Term Plan (2019). Studies involving

Simpson and *Barlow* have been cited in NHS England's new 'Framework for Community Mental Health Support, Care and Treatment for Adults and Older Adults' (2019) and the national independent review of the Mental Health Act (2018). Also within mental health, *McCabe* contributes to The Alzheimer's Society's *Understanding your Diagnosis* booklets and is co-author of a key publication from The British Psychological Society, *Communicating a diagnosis of dementia*, from the Faculty for the Psychology of Older People. *Ayers'* research has been cited by professional organisations including the RCM and the Royal College of Obstetricians and Gynaecologists (RCOG); she served on the panel for the All-Party Parliamentary Group '1001 Critical Days' inquiry that produced the 2015 report *Building Great Britons*; was an invited member of the 2019 Parliamentary Working Group on Birth Trauma; and sits on the Birth Trauma Association advisory board.

Within nursing, *Sin* is a review consultant for the NICE Clinical Knowledge Summaries (CKS) topic Psychosis and Schizophrenia and *Castro-Sanchez* is an expert advisor for the NICE Centre for Guidelines. For the past 15 years *Lawrenson* (Applied Vision) has developed Clinical Management Guidelines for the College of Optometrists and has also worked with the NICE and WHO. More closely connected to industry, *Hull* and *Jones* are members of the British Standards Institution (BSI) committees for ophthalmic instrumentation and virtual/augmented reality technology respectively, helping to set manufacturing standards and contributing to the quality and marketability of products.

International grant reviewing: Staff members involved in international grant reviewing over the assessment period include: *Aitken* (European Science Fund and the German Federal Ministry of Education and Research); *Botting* (Swiss National Science Foundation); *Crabb* (NIH National Eye Institute grants, USA and National Research Foundation, Singapore); *Douglas* (Natural Sciences and Engineering Research Council Canada and North Pacific Research Board); *Hoe* (Academy of Finland); *Hull* (Foundation for Polish Science and the Information and Technology Commission, Hong Kong); *McCabe* (National Endowment for the Humanities, USA and the Netherlands Organisation for Health Research and Development); and *G Morgan* (National Science Foundation, USA and Social Sciences and Humanities Research Council, Canada) as examples. These staff members are senior staff involved in mentoring others who can bring their perspective from international grant reviewing to help develop more junior staff.

Editorships: Several staff members hold editorships of journals, including *Ayers* (*Journal of Reproductive and Infant Psychology*), *Lawrenson* (Coordinating Editor, *Cochrane Eyes and Vision*), *Botting* (Editor-in-chief, *Autism and Developmental Language Impairments*) and *Hilari* (Editor-in-chief, *International Journal of Language and Communication Disorders*). In addition, others hold roles as Associate Editors, e.g. *Anderson* (*BMC Nursing*), *Castro-Sanchez* (*BMC Public Health*), *Henry* (*British Journal of Developmental Psychology*), *Ahmad* (*Public Health*) and *Hoe* (*Ageing and Mental Health*).

There are many further examples of staff in this UOA who are members of editorial boards, covering all Research Centres.

Grant panels: Several staff members are part of NIHR panels (*Gillard*, Programme Grants for Applied Research; *Marshall*, clinical/senior clinical lecturer panel; *Cruice*, chairing team member clinical doctoral research fellowship scheme; *Harden* and *Henry*, HTA [health technology assessment] commissioning board; and *Salmon*, NIHR/CNO [Chief Nursing Officer] Clinical Academic Training Programme). In addition, *Botting* is part of the UK Research and Innovation (UKRI) Peer Review College and *G Morgan* is a member of the ESRC Peer Review College. Members of grant panels for charity funders include: *Crabb* (Fight for Sight); *Francis, Hurt* (Cancer Research UK); *Henry* (Autistica charity for autism-related research); *Hilari* (Stroke Association); and *M Morgan* (Royal Society Wolfson Awards Committee).

Awards and fellowships. *Marshall* received an OBE for services to aphasia (2018) and *Meyer* received a CBE for contributions to nursing and care for older people in 2015. The *Nursing Times* judged *Meyer* to be one of the country's most inspirational nursing leaders. In applied vision, *Crabb* was awarded the Royal College of Ophthalmologists' Edridge Green Medal (2015), *M Morgan* is a Fellow of the Royal Society and *Douglas* is a Fellow of the Linnean Society. Within nursing *Aitken* holds a Fellowship of the Australian College of Nursing, *Salmon* gained a Fellowship by

Distinction of the Faculty of Public Health (2019), *Sin* is a Fellow of the European Academy of Nursing Science and *Llahana* received a NHS Leadership Academy Award (2016). Several staff also hold fellowships of professional organisations, such as *Newman* (British Psychological Society), *Marshall* and *Chiat* (Royal College of Speech and Language Therapists) and *Lawrenson* and *Subramanian* (College of Optometrists) to list a few.

Several current academic and research staff also hold or have held fellowships to support their career development during the assessment period. They include: *Bowden* (Barts Charity clinical doctoral fellowship, 2019–2022); *Northcott* (Stroke Association Jack and Averil Mansfield Bradley Fellowship Award for Stroke Research, 2016–2020); *Smith* (NIHR clinical doctoral fellowship, 2018–2022); *Jones* (Fight for Sight fellowship); *Ometto* (Wellcome fellowship); *Montesano* (EU Innovative Medicines Initiative fellowship); *Curtin* (NIHR clinical doctoral fellowship); and *S Morgan* (Barts Charity clinical doctoral fellowship).

Honorary positions enhancing collaborations. The following positions reflect the international esteem our researchers are held in, and are all at professorial level. *Aitken* (Barts NHS Trust); *Anderson* (University of Stavanger); *Ayers* (University of Sussex); *Botting* (University of Aalborg, Denmark; University of Manchester; Tavistock and Portman NHS Trust); *Crabb* (Moorfields Eye Hospital); *Douglas* and *Lawrenson* (UCL); *Eriksson* (Karolinska Institutet, Sweden); *Francis* (University of Toronto; Ottawa Hospital Research Institute); *Gillard* (St George's, UoL); *Hilari* (North-East London NHS Foundation Trust); *McCabe* (University of Exeter; Wolfson Institute of Preventive Medicine; Queen Mary UoL; Devon Partnership NHS Trust); *M Morgan* (Max-Planck Institute of Metabolism, Cologne, Germany); *Tyler* (Smith-Kettlewell Brain Imaging Centre; Californian Institute of Integral Studies; Low Vision Research Centre, Institute of Vision, Essilor International Paris; Department of Psychology, National University of Taiwan); and *Verhoeven* (University of Antwerp). These honorary positions reflect highly productive collaborations both nationally and internationally.