

Institution: University of Reading
Unit of Assessment: UOA4 Psychology, Psychiatry and Neuroscience
<p>1. Unit context and structure, research and impact strategy</p> <p>1.1 Overview</p> <p>The School of Psychology and Clinical Language Sciences focuses on research at the interface between fundamental and applied questions, in areas including child and adolescent anxiety and depression, autism, diet–brain interactions and motivation, so that we can influence policy and practice in a number of areas. We work closely with the NHS, hosting several research clinics on campus, and collaborate with a wide range of industrial partners.</p> <p>We are an outward-facing School in the way that we interact with the public, government, industry and most notably with patients. For example, there are approximately 2,200 clinical and research visits by patients per year to our research clinics. Our NHS Anxiety and Depression in Young People Research clinic (AnDY) assesses and treats anxiety and depressive disorders in 7- to 17-year-olds and provides a platform through which we develop, test and disseminate evidence-based interventions. Our Centre for Autism is a regional hub for clinical services and informs and draws on research in the School to develop and assess treatments for autism. The Speech and Language Therapy clinic, which runs both NHS and independent services open to adult and paediatric client groups with a wide range of speech, language and communication difficulties, allows new ideas and therapies to be tested in clinical populations as well as providing research-led treatment. We are a major provider of clinical training for therapists on the Department of Health's Improving Access to Psychological Therapies (IAPT) programme through the Charlie Waller Institute. Training draws on our research findings to ensure practitioners have state-of-the art knowledge and tools to support their work.</p> <p>There are three dominant strands to our research: Psychopathology and Affective Neuroscience (PAN), Cognitive Science (CS), and Personalised Nutrition and Applied Research (PNAR). These reflect the natural groupings, collaborations and regular research meetings within the School and across the University (see Section 1.2). Since all three strands address underpinning neural mechanisms, we substantially enhanced our infrastructure in the Centre for Integrative Neuroscience and Neurodynamics (CINN) over the assessment period, with a £1.75m MRI scanner upgrade in addition to personnel and operating costs (see Section 3.3.1).</p> <p>Our annual research spend has grown substantially (see Figure 2 in Section 3), doubling from 2014 to 2020. Importantly, this trajectory is sustainable given the awards include seven large early-career fellowships and new-investigator grants to recently appointed academics. Our research is now supported by a wider range of funders including UKRI, UK charities (particularly Leverhulme), UK Government and the EU. Our outputs are influential, evidenced by citation rates that benchmark favourably against our peers (Figure 1 below) and we continue to have a strong international reputation: over this REF period, high-profile academics including Ellen Bialystok, Noam Chomsky, Daniel Dennett, Elizabeth Loftus, and Steven Pinker joined us as Albert Wolters Visiting Professors to the School.</p> <p>1.2 Structures</p> <p>As described in the Institutional Environment Statement (IES, Section 1), since 2014 research activity at the University has been structured around 35 Research Divisions, which fall under four interdisciplinary research themes, each led by a Research Dean. Staff returned to UOA4 constitute one of the six Research Divisions – Psychology and Clinical Language Sciences – within the Agriculture, Food & Health research theme. UOA4 is almost perfectly coextensive with the School of Psychology and Clinical Language Sciences; henceforth, 'School' and 'UOA' will be used interchangeably. Research in the School is led by two Research Division Leaders (RDLs) who job-share, plus an Impact Lead, supported by the Dean and Head of School.</p>

We are a medium-sized research community, returning 44.9 FTE of Category-A staff (27.5 female), supported by 28.2 FTE of contract research staff and supervising approximately 110 doctoral students. Among the Category-A staff, 33.7 FTE are permanent; the average contract duration of fixed-term staff is 5.3 years (minimum 3). The School occupies a single large building, which strongly supports collegiality and research collaboration.

Interdisciplinary research is supported through the University's ten Interdisciplinary Research Centres (IDRCs, see IES, Section 2.1.1), two of which are hosted in the School – the Centre for Integrative Neuroscience & Neurodynamics (CINN) and the Centre for Literacy & Multilingualism (CeLM). We are also a key partner in the Centre for Cognition Research (CCR, led by Philosophy) and the Institute for Food, Nutrition & Health (in collaboration with Agriculture, Policy & Development and Food & Nutritional Sciences).

1.3 Unit research groupings

Our work is organised into three interlinked research strands:

1.3.1 Psychopathology and Affective Neuroscience (PAN, 26 staff)

PAN's research spans the interface between fundamental research on mechanisms of emotion and psychopathology, and the development of evidence-based treatments. PAN researchers have been increasingly successful in winning funding during the assessment period; substantial awards to ECRs and emerging leaders in their fields ensures the sustainability of the group. Examples include: **Dodd's** UKRI Future Leaders award for research on how adventurous play protects children against anxiety; **Tavassoli's** Marie-Curie Fellowship on sensory reactivity in autism and its relationship with anxiety; **Waite's** NIHR Fellowship on adapting a cognitive therapy for the treatment of panic disorder in adolescents; **Morriss's** ESRC Future Leaders award for research on intolerance of uncertainty and anxiety. Since 2014, PAN members have won £9.56m largely from NIHR and MRC, including **Creswell's** £1.3m NIHR Professorship ('Treatments for childhood anxiety disorders: Improving patient access and clinical effectiveness'), and **Chakrabarti's** £3.65m GCRF (MRC) award (£840,000 to Reading: 'GCRF: Scalable Transdiagnostic Early Assessment of Mental Health (STREAM)'). The appointment of **J.Hill** brought substantial MRC funds to Reading, especially through his role as PI on the Wirral Child Health and Development Study (WCHADS) since 2004. Our strength in this area has been recognised nationally and internationally, with **Chakrabarti** winning the Philip Leverhulme Prize and being nominated to the Young Academy of Europe, **Creswell** receiving the British Medical Association President's Award, and **Cooper** appointed as Fellow of the British Academy. PAN researchers publish in top international journals such as the *American Journal of Psychiatry*, *Clinical Psychology Review*, *JAMA Neurology*, *JAMA Psychiatry*, *The Lancet Psychiatry*, *Molecular Psychiatry*, *Nature Human Behaviour*, *PLoS Medicine*.

1.3.2 Cognitive Science (CS, 29 staff)

This group is inherently interdisciplinary, integrating research in language, learning, memory and forgetting, perception and – especially in recent years – motivation. Many of the basic cognitive processes studied by CS are complementary to the clinical and translational work of PAN members, notably work on cognition in anxiety, intolerance of uncertainty, and the role of reward in pain perception.

Language is an established strength, with key areas of research including impairment, typical and atypical development, and psycholinguistics. Psycholinguistics research is carried out through interdisciplinary collaborations with the Department of English Literature and Applied Linguistics (thus two staff are returned to UOA26 – Cunnings and Serratrice). Much collaboration focuses on bilingualism and multilingualism, where Serratrice provides leadership of the **Centre for Literacy & Multilingualism** (IES, Sections 3.4 and 2.1). CS researchers collaborate with philosophers through the **Centre for Cognition Research**; **Glennerster** and **Christakou** are key contributors to the CCR Summer Seminar Series, funded by AHRC, Leverhulme and the Templeton Fund since 2014.

Research funding won by CS colleagues since 2014 totals £6.02m. Larger awards include **Murayama's** Leverhulme Research Leadership award (£1m) for 'An integrative theory of interest: How can we motivate ourselves without extrinsic incentives?'; **Liu's** ERC Starting Grant worth €1.5m, 'Cracking the pitch code in music and language: Insights from congenital amusia and autism spectrum disorders'; **Glennerster's** £740,000 from EPSRC and DSTL, 'Understanding scenes and events through joint parsing, Cognitive reasoning and lifelong learning'; a £4.5m ERC grant (£250,000 to Reading) 'Advancing the European multilingual experience' awarded jointly to **Saddy** and international colleagues, which led to a subsequent £3.1m ERC European Training Network (£420,000 to Reading), 'The multilingual mind'. As with all groups, ECR's have secured significant awards, notably **Hedger**, with a Leverhulme Early Career Fellowship on spatial aspects of social attention.

The international reputation of this research strand is evidenced by a Leverhulme Visiting Chair (Bishop) and seven personal awards and prizes to **Murayama**, including the Jacobs Foundation Advanced Research Fellowship (£400,000), and the FJ McGuigan (American Psychological Foundation) Early Career Investigator Prize. CS researchers have published in leading journals such as *Brain*, the *Journal of Personality and Social Psychology*, *Nature Neuroscience*, *PNAS*, *Psychological Bulletin*, *Psychological Methods*.

1.3.3 Personalised Nutrition and Applied Research (PNAR, 14 staff)

This interdisciplinary grouping works at the interface between basic and applied research. Collaboration with the School of Pharmacy on the utility of cannabis-derived compounds has focused on two areas: stimulation of appetite to prevent malnutrition, for example in chemotherapy patients, and reduction of epileptic seizures. This resulted in a new medicine, Epidiolex, which was the first cannabinoid-derived medicine to be approved in the USA and EU for clinical use in epilepsy. In 2019 **Williams** was awarded the British Pharmacological Society's Sir James Black Award for Contributions to Drug Discovery and was runner-up in the 2020 Guardian University Awards Research Impact Category in recognition of this work. Other PNAR research investigates the interplay of dietary intake with measures of cognitive performance, mood, visual function and wellbeing. The role of the gut-brain-axis in this is being investigated within a major ERC Consolidator grant (€2m) to **Chakrabarti** to map the role of gut microbiota on brain and behaviour.

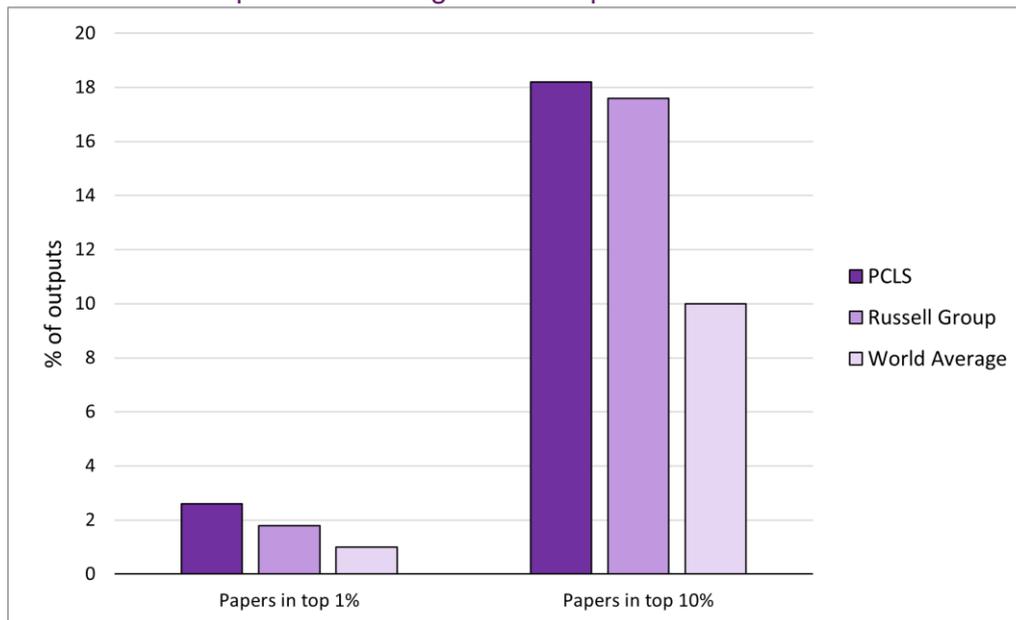
A further focus is to understand how social, cognitive, sensory and economic factors interact to influence food choice across the lifespan. Research and translation of food-related research is facilitated through Reading's leading position in the €450m European Institution of Innovation and Technology (EIT) Food Consortium. EIT Food, which seeks to transform the way in which we produce, distribute and consume food throughout Europe to improve consumer confidence and health, is a partnership of over 100 leading companies (e.g. Bosch, Pepsico, Siemens, Waitrose), universities, and scientific partners covering the entire food chain. Six PNAR projects have been funded by EIT Food to date, including **Houston-Price's** €999,000 award for 'SEE & EAT: Communicating the benefits of visual familiarity as a strategy for introducing healthy foods into children's diets'.

We also develop technological aids, e.g. for people with dementia and Alzheimer's disease, and contribute to building design (e.g. in relation to reducing distracting background noise). New work in this area by **Roesch**, with collaborators in Bristol, Greenwich, QMUL and UCL on how humans interact with emerging technologies such as artificial intelligence and the internet of things has won total funding from ESRC of £2.75m (£700,000 to Reading). **Chakrabarti** has two MRC awards to translate lab-based assessments of adult mental health and developmental neuropsychiatric disorders to apps that can be used by non-specialists in low-resource settings; the apps are currently being trialled in India and Malawi. The appointment of **Weinstein** in summer 2020 has opened up several exciting new avenues of applied research; she brings with her a €1.5m ERC starter grant is to develop interventions that increase resilience to loneliness in older adults (with clear societal relevance during COVID-19 lockdowns); and she also works to improve unconscious bias training for the police force.

Funding under this theme totalled £3.16m, including a growth in funding from industrial partners (particularly GWPharma, Naturex-DBS, Polyphenolics Incorporated, Wild Blueberry Association of North America). Work in this area has been published in top journals including *American Journal of Clinical Nutrition*, *American Journal of Psychiatry*, *Psychological Science*.

Across all three research strands, research income has been translated into high-quality outputs. Figure 1 shows that the quality of our publications compares favourably with the Russell Group average in UOA4.

Figure 1. Publications compared according to citation percentiles



Data are for UOA4 at Reading, UOA4 in comparable universities (Russell Group), and world average. Self-citations were excluded. **Methodology:** in May 2020 we searched Scival to locate publications in the three ASJC areas relevant to UOA4: Psychology, Psychiatry and Mental Health, and Neuroscience. For Reading this retrieved 622 unique articles and reviews in peer-reviewed journals. Publications by former staff were included if they appeared before their leaving date. Repeating the comparison without filtering by subject area reveals an advantage for the Russell Group, indicating that UOA4 is an area of relative strength within Reading.

1.4 REF2014 objectives

We have been successful in delivering our REF2014 strategic objectives, as follows. First, our commitment to expand and enhance clinical infrastructure, and strengthen links with clinicians to facilitate our research and translation into clinical practice, has been delivered through three major projects:

- In 2016 we established an independent Anxiety and Depression in Young People Research Clinic (AnDY). This superseded the NHS unit previously located in the School and now employs 10.8 clinical staff funded by the NHS and Health Education England, 2.6 NIHR research staff, and a full-time Clinic Director, funded by the School. As a clinical service, AnDY is critical to delivering the NHS IAPT integrated stepped care model in Berkshire, providing assessment and treatment for 7- to 17-year-olds requiring more than low-intensity intervention, but not qualifying for NHS CAMHS services. AnDY has a number of NHS contracts (>£1.25m to date) to deliver this service until 2023. Of more than 800 patient referrals to AnDY since 2016, over 500 have taken part in research studies. This is a powerful clinic-research synergy: 11 of our Category-A staff have published papers reporting AnDY studies.
- We established the Centre for Autism (CFA), a unique research clinic and autism diagnosis service for the south of England. It has performed 392 diagnostic assessments, 157 psychological interventions and 16 specialist language therapy

interventions. Many patients volunteer to participate in CFA research, which has won over £3m in grants. Research activity is directed by **Chakrabarti**, supported by two academic appointments since 2014 (**Liu, Tavassoli**), while clinical activity is led by **Loucas**.

- The Thames Valley Clinical Trials Unit (TVCTU) was established as a tripartite partnership between the University, Royal Berkshire NHS Foundation Trust (RBFT) and the local community and mental health NHS Trust (Berkshire Healthcare Foundation Trust) and housed in our School. Reflecting the strong clinical research within our UOA, the TVCTU has supported or run trials for researchers including **Creswell, Cooper, J.Hill, Steel, Stojanovik, Waite**. Reflecting the growing partnership between the University and RBFT, we plan to develop the TVCTU into a joint research support structure to facilitate major grant proposals.

Fulfilling our commitment to strengthen research in key areas, we made five new appointments in PAN (**J.Hill, Jenkins, Orchard, Tavassoli, Waite**); four appointments were made in CS to support language research (**Pagnamenta, Pliatsikas**, along with Cunnings and Serratrice); and one in PNAR to support lifespan/ageing (**Astell**). See Table 1 (in Section 2).

In line with our plan to diversify and increase our research income, our industrial funding has increased throughout the REF period (total £1.56m; see Figure 3 in Section 3). Total spending from external awards more than doubled during the assessment period (Figure 2), and grant capture has met or exceeded our targets each year (Section 3.1).

As planned, we have been successful in promoting translation of our research. Section 4.3 describes 12 projects maturing towards future impact cases. For example, meeting a specific REF2014 aim, **Williams**' work on animal models of epilepsy was central to the development, approval, commercialisation and clinical use of cannabidiol as an effective treatment for epilepsy.

Our aim to continue to develop our infrastructure has been supported by major investments in both in hardware and personnel for neuroscience research with £1.75m to upgrade our MRI scanner and other equipment, combined with £275,000 per annum investment in staffing and running costs (see 3.3.1, also 3.3.4).

1.5 Future strategy and vision

Our guiding principle is to continue contributing to society by undertaking rigorous research at the boundary between fundamental and applied science. Below, we describe plans which flow from this vision: new appointments in the key area of child and adolescent mental health, to ensure sustainability following recent departures; institutional and governance changes to promote clinical work; and further investment in our existing strengths in nutrition and language research.

Child and adolescent anxiety and depression research, and mental health research more broadly, will be strengthened by three new academic appointments in late 2020. Professor Stella Chan has been appointed to the Charlie Waller Chair in Evidence-Based Psychological Treatment, a post co-funded with the charitable Charlie Waller Trust. Chan brings several large grants in the area of adolescent depression, and extensive experience of engaging with public and professional stakeholders. She will enhance coordination of clinical activities across the School to build on the opportunities provided by the AnDY clinic and Charlie Waller Institute. Her appointment is complemented by two recent lectureships in Clinical and Health Psychology: Katherine Finlay works with NHS collaborators on the psychological management of chronic pain, and Samrah Ahmed brings NIHR funding to study dementia.

We will continue to build autism research and further exploit the clinic-research synergy in the Centre for Autism. In 2021, Catherine Manning, who has a Wellcome Fellowship to study perceptual processing in autism, will join the existing group including **Chakrabarti, Liu, Loucas, Tavassoli**. In Speech and Language Therapy, two new Lecturers specialising in Adult and

Acquired Disorders of Language/Communication will take up posts early in 2021. One of these has already been appointed: Fatemeh Mollaei has expertise in speech disorders within Parkinson's disease, supporting the work of Ho.

Both new and existing staff will benefit from further expansion of the Joint Academic Board, formed between the University and Royal Berkshire NHS Foundation Trust and supported by £1.15m of joint funding over 3 years (IES 2.1.2). Four staff (**J.Hill, Honisch, Van Reekum, Williams**) have received pilot study funding and this seed-funding scheme will expand to include larger proof-of-concept studies for trials and full research proposals, alongside a new initiative to embed University researchers within the hospital. With our mental health focus we are well positioned to benefit from a deeper relationship with Berkshire Healthcare Foundation Trust, facilitated by a recent relocation of their Child and Adolescent Mental Health service to a building adjacent to our School on campus. Within the School, we have improved coordination of clinically focused activities by appointing a Director of Clinical Governance and Partnerships (Barbara Evetts, part of our Charlie Waller Institute) to join the School Management Board. The Director will strengthen relationships with external partners who support, and use, our clinical training and clinical service provision; such partners are critical to the continuing success of our clinical research.

To accelerate development of nutrition research, we will expand our wet-lab facilities substantially so that blood and tissue samples can be processed on-site. This facility will further expand our interdisciplinary collaboration with Reading's gut microbiome and food and nutrition researchers and expand the range of research questions that can be addressed by our brain-imaging researchers since neural measures and concurrent blood and tissue samples can be analysed together.

1.6 Impact strategy

The fact that our research spans the interface between basic and applied domains leads naturally to translational benefits for society. At School level, our appointed Impact Lead supports and raises the profile of impact activities, and is the interface with the Impact Team, Contracts Team and Knowledge Transfer Centre. We have benefitted from the University's Impact Support Programme (BOISP, IES, Section 2.3), which has provided c.£150,000 to support two of our returned cases as well as 6 other projects developing a range of interventions. BOISP supports an extensive pipeline of work, providing planning advice and seed-funding for early-phase projects through to commercialisation advice for projects nearing completion. Individuals' impactful research is highlighted in Annual Personal Research Plans from which requests for resource or support are collated.

School and University support for our applied research has resulted in 12 maturing impact projects in addition to our returned case studies, all involving partnerships with external organisations (see Table 3). Access to national and international networks supports impact development, exemplified by University membership of the EIT Food Consortium, and EIT Food for Health Initiative, which provide funding for translating research into practice and/or commercial activity.

1.7 Open research, reproducibility and integrity

The School is a discipline leader in this area, manifested most recently in our proposing and now leading the South East of England Replication in Psychology Syndicate (SERPS). This collaboration between Essex, Royal Holloway, Surrey, Sussex, and Reading means that replications of studies can happen more quickly and reliably than they do through the larger-scale international replication initiatives, for example with lab visits between nearby sites to ensure methodological comparability. We have invested significant School resources in GDPR-compliant online data collection, to facilitate larger sample sizes (see 3.3.3). The SERPS initiative arose from our long-standing and growing engagement with open and reproducible science: our ECRs and PhD students run an active local chapter of the ReproducibiliTea journal club initiative, holding fortnightly meetings; CINN holds monthly Reproducible Imaging seminars; and in 2019 we launched an Open Science Summer School with external speakers and

participants. Reflecting these efforts, 17 of our staff have either published a registered report or published pre-registered studies (e.g., OSF). **Feredoes**, **Roesch** and **Van Reekum** have each contributed internationally to the reproducibility agenda (e.g., **Van Reekum** as Editor-in-Chief introduced Registered Reports to *Cognition and Emotion*).

Open and reproducible science is strongly encouraged at an institutional level (IES Section 2.2) The University has a pioneering approach to open research and was the first UK university to publish a Statement on Open Research. School staff make a major contribution to these activities. **Roesch** (Reproducible Neuroimaging INCF Fellow) and **Beaman** are members of the University's Committee for Open Research and Research Integrity (CORRI), determining strategy and policy in this area; **Van Reekum** and **Roesch** were speakers at the 2019 Open in Practice conference, and **Beaman's** group was recipient of the University's inaugural Open Research Award for its work on crowd-sourcing in research.

The University is a signatory to the Concordat to Support Research Integrity. Ethical scrutiny procedures, in which simpler cases are delegated to our local ethics committee, are described in the Institutional Environment Statement (Section 2.2). Compliance with data protection and GDPR by software used in data collection is ensured by the University Design Authority Group (DAG).

2. People

2.1 Staffing strategy

We have invested significantly in order to enhance our areas of strength. A key strategy has been to recruit talented ECRs, with the potential to become future research leaders, within groupings that have critical mass. Thus, we maintained or expanded our three research groupings during the assessment period through 22 Category-A appointments, including four independent research fellows, summarised in Table 1. We are returning 12% more FTE to REF2021 than REF2014 and we employ 7.0 FTE Teaching-Intensive academics and approximately 11.5 FTE Teaching Fellows which has allowed us to make new appointments based on strategic research priorities rather than teaching needs. Following a number of retirements, the age profile of our staff is reduced and hence we face no succession planning issues in the next REF cycle.

Table 1. Category-A appointments since 2014

Name	Research interests	Strategic value
Psychopathology and Affective Neuroscience		
Professor Jonathan Hill (plus two PDRAs for one year)	Prenatal and postnatal origins of psychopathology. PI of Wirral Child Health and Development Study	Strengthen core topic; helped launch clinical trials unit
Paul Jenkins	Eating disorders	Broaden coverage of psychopathology
Fang Liu	Speech and music processing in autism and amusia	Building and bridging autism and language groups (PAN/CS)
Faith Orchard	Sleep disturbance in depression	Broaden depression research
Teresa Tavassoli	Sensory aspects of autism	Build critical mass in autism with Chakrabarti and Loucas
Polly Waite	Child and adolescent anxiety	Strengthen core topic
Cognitive Science		
Professor Ingo Bojak	Computational modelling of local field potentials and multi-unit neural recordings	Build computational modelling expertise in CINN
<i>Ian Cunnings (submitted to UOA26)</i>	<i>Multilingualism and psycholinguistics</i>	<i>Critical mass in multilingualism</i>
Katie Gray	Face perception and prosopagnosia	Broaden coverage of perception; clinical angle links to PAN

Julianne Honisch	Synchronisation of movement between actors in dance	Broaden CS research
Emma Pagnamenta	Treatment of language disorders in children	Expertise in clinical research, capacity building to increase research output of Speech and Language Therapy clinics
Christos Pliatsikas	Neural basis of language and multilingualism	Brings language research in CS into the MRI scanner
Peter Scarfe	Depth perception and Virtual Reality	Build critical mass in virtual reality with Glennerster
<i>Professor Ludovica Serratrice (submitted to UOA26)</i>	<i>Multilingualism and psycholinguistics</i>	<i>Leadership of CeLM, promoting interdisciplinary language research</i>
Personalised Nutrition and Applied Psychology		
Professor Arlene Astell	Technological aids for age-related impairment	Translation of PNAR research
Daniel Lamport	Nutrition and the brain	Translation of 'neutra-ceuticals' to market; Critical mass in nutrition research with Williams and Field
Etienne Roesch	Human/technology interactions such as AI and internet of things	Broaden PNAR research; Translation to market
Netta Weinstein	Solitude versus loneliness, especially in older adults; unconscious bias	Broaden PNAR research. Clear opportunities for translation
Independent Fellows		
Wiebke Gandhi	Neural basis of pain perception	Basic questions with potential translation (PAN, CS)
Nicholas Hedger	Spatial aspects of social attention	Links between existing CS researcher topics
Claire Hill	Online interventions for mental health disorders	Translation of PAN research
Jayne Morriss	Relationship between intolerance of uncertainty and anxiety	Broaden anxiety research in PAN; links with cognitive processes in CS

2.2 Staff development

Successful staff development is reflected by the 40 promotions achieved since 2014: 24 to Grade 8 and 16 to Grade 9. Another indicator of successful staff development is the seven ECRs who have established independent labs by winning large early-career fellowships or new-investigator grants (**Dodd, Hedger, Liu, Morriss, Salomons, Tavassoli, Waite**).

Our strategy is critically dependent on support for the development of staff research careers. This includes providing a vibrant, collegiate research environment to promote and support research—and on direct support for individuals. These two aspects are addressed below.

2.2.1 Supportive environment

We ensure that teaching and research staff have time for research by employing and valuing teaching-intensive academics and teaching fellows. This policy permits:

- ringfencing one day per week for research and professional development (in addition to time allocated to funded projects/PhD supervision)
- substantially reducing teaching and administration loads for new appointments (generally ECRs) for their first two years in post
- giving staff one-year sabbaticals when they step down from substantial leadership roles; supporting teaching buy-out to enable writing of key papers via University Research Fellowships
- a formal sabbatical scheme to which staff, including part-time and fixed-term, may apply for a substantial period of leave for research purposes. This was formalised in 2020, replacing an informal system of allocating research leave to support grant-writing.

Research staff development is supported by the provision of funded studentships. Since 2016, the School has invested annually in up to three fully funded PhD studentships, to work with ECRs and staff re-establishing labs after career breaks (11 studentships to date). Details of internal and external PhD funding schemes, and the School's success in these, is given in Section 2.3.

Financial support for staff, projects, and equipment comes from both University and School funds:

- The University's Research Endowment Trust Fund (RETF) has provided over £15m in targeted support during the assessment period (IES, Section 4.3). The School has been a major beneficiary of this through the £1.75m investment in CINN and the MRI, and through £641,000 of pump-priming to 20 of our staff.
- All Category-A staff have Staff Development Accounts to fund research travel and equipment needs that are added to from grant overheads and are topped up annually from School funds. New staff receive £5,000.
- All staff, including ECRs, can apply to the School Research Committee fund (up to £50k per annum), which is used to provide, for example, equipment for pump-priming projects.

Regular research events and meetings encourage collaboration and networking:

- Thursday Seminars feature national and international speakers (more commonly international since the COVID-19 lockdowns)
- Tuesday Seminars are for PDRAs and PhD students to share research
- Our Research Division Leaders (RDLs) organise a monthly multi-format series including brief research updates, 'data blitzes', sessions on methodological and statistical innovation, sessions on funding opportunities, grant proposal pitches, etc.
- Regular informal lab meetings and methods-focused meetings (e.g. Coding Club)
- Since 2015, we have invested £20,000 p.a. in the Albert Wolters Distinguished Visiting Professor scheme (named after our first Head of Psychology and Honorary Fellow of the British Psychological Society). International professors give high-profile public lectures and participate in seminars and social events providing networking opportunities for staff and doctoral students. Awardees have been Daniel Dennett (2019), Elizabeth Loftus (2018), Noam Chomsky (2017), Steven Pinker (2016), Ellen Bialystok (2015). In 2021 alumnus Max Coltheart will join us to celebrate 100 years of Psychology at Reading.

To provide transparent and representative governance, and celebrate success:

- The School's Research Committee includes the Head of School, RDLs, REF lead, ECR mentor, ECR representative, Impact Lead, MRI scanner representative and Director of Postgraduate Research. RDLs are also members of School Management Board and connect School governance to that of the University. Staff contribute to the annual Research Division Operational Plan via Personal Research Plans discussions
- Individual successes are celebrated through School circulars and monthly newsletter, Celebrating Success awards, the University's Spotlight on Success feature, and the monthly research newsletter.

Staff benefit from strong technical and administrative support:

- IT and technical support for research is provided centrally (IES 3.5); the School supplements this with a 1.0 FTE Research Technician to support student research
- Laboratory refurbishments and equipment builds are supported centrally, including from RETF for special requests
- We employ 9.9 FTE of Executive Support to reduce the administrative load on academics, of which 1.3 FTE is dedicated to the RDLs/REF Lead.

Funding applications and impact activities are supported by specialist teams within Research and Enterprise Services, which has been expanded by 23 FTE (c.50%) since 2015 (IES 4.2 and 2.3). A Research Development Manager (RDM) is dedicated to the School, supported by an

Assistant RDM, a dedicated EU applications unit, GCRF manager, due diligence personnel, a Research Contracts Manager who checks funder terms and conditions before grant submission, a Research Data Manager, and the Impact Team. The Knowledge Transfer Centre and KIC Partnerships Team support work with commercial partners and IP matters.

2.2.2 Supporting individuals

In 2016, the University introduced more transparent probation and promotion criteria (IES 3.4) and the School has further expanded on this. We have introduced senior academic line managers for Category-A staff: professorial line managers are each responsible for 8 to 10 academic staff. Managers hold regular mentoring meetings and conduct annual Performance and Development Reviews, focused on development, achieving probation and promotion, and training needs.

The Research Division Leaders assign mentors to all staff who are writing grants, including ECRs. Staff use the annual Personal Research Plan process to request infrastructure and other support. Research staff also benefit from the University's commitment to broaden access to – and training for – leadership roles. Key roles to which colleagues have been appointed include: Directorship of two IDRCs (CINN, **Christakou** and CeLM, Serratrice); Dean of Diversity & Inclusion (Laville, an active member of the Charlie Waller Institute alongside this role); and membership of the University Committee for Open Research and Research Integrity (**Beaman, Roesch**).

2.2.3 Researcher Development Concordat

In 2019 we implemented an ECR programme, appointing a mentor for all ECRs, PDRAs or Research Fellows independent of their PIs (**Pliatsikas**). This has led to ECRs reporting higher levels of satisfaction, reflected in the results of a survey carried out annually by one of our PDRAs. The Mentor discusses the Concordat with research staff and represents their interests in the departmental Research Committee. Recruitment and promotion of researchers is merit-based and follows standard HR procedures, based on the twin criteria of independence and achievements. PIs who line manage researchers undergo training, including on conduct of constructive performance and development reviews. Researchers may request flexible working arrangements on an identical basis to other staff.

2.3 Postgraduate research students

Through our PGR Admissions Tutor, we find tailored solutions for a diverse body of doctoral students, including those with protected characteristics (Table 2). The number of our doctoral students grew by ~30% during the assessment period from 84 in 2013/14 to 107 in 2019/20 (2.4 per FTE). Students benefit from strong support within the School; all students have two supervisors, and we train junior academics in PhD supervision by pairing them with an experienced supervisor.

We continue to succeed in winning doctoral funding from major external bodies – over the assessment period we have 14 students funded by ESRC, 6 by EPSRC, 6 by MRC, 2 by ERC, 2 by the Leverhulme Trust, and 5 by the Felix Foundation. We are part of two DTPs: SenSS ESRC DTP and the Reading-based BBSRC FoodBioScience DTP, held jointly with Department of Food & Nutritional Sciences.

Our students receive extensive institutional support, training, and networking opportunities (IES, Section 3.7). In their first month, all doctoral researchers carry out a Learning Needs Analysis, which is reviewed yearly. Progress is monitored by two independent academics who receive written reports from the student and supervisors and carry out a face-to-face interview each year. In their second year, all students undergo a confirmation of registration interview with their monitors. This careful process has supported 122 completions during the assessment period. Our students have won the University's PhD Researcher of the Year prize twice since 2014 (**Orchard, Pilkington**), and have twice been invited to give the University's annual Fairbrother public lecture (Peres, Voits). The indicators of success given in the IES (Section 3.7) are

mirrored in the School, with one exception: our percentage of publications involving PGR authors is even higher, at 21%.

The School supplements the broad range of courses in study skills, communications and research methods that are offered by the Graduate School with discipline-specific training from our MSc programmes. This includes statistics (refresher, advanced, and modelling using R); qualitative methods; systematic review; fMRI data analysis; and MATLAB programming. To encourage engagement with the wider academic field and practise presentation and networking skills, all students attend national and international conferences. PGRs are an integral part of our academic community, joining in with and organising social events, and we continue the tradition of paying for them to join post-seminar dinners with visiting speakers.

Table 2. Demographic profile of research students (2019/20)

Gender	%	Disability	%	Age	%	Nationality	%	White %	BAME %
Male	25	Declared	15	21 to 24	22	UK	47	90	10
Female	75	Not declared	85	25 to 34	53	International*	53	46	54
				35+	25	*from 30 countries			

2.4 Diversity and inclusion

The University's commitment to supporting and promoting D&I is described in the IES (Section 3.2). We actively engage with institutional initiatives; the current University Dean for Diversity (Laville) is from the School, and many staff are active in diversity networks. To widen access to leadership roles we promote flexible working and both the Head of School and RDL roles have been job-shared. We achieved an Athena SWAN Bronze award in 2017 and, having made good progress on our action plan following the institution of a Wellbeing, Inclusion, Diversity and Equality (WIDE) committee in 2019, we have every expectation of a positive outcome to our recent submission for a Silver award.

Changes in the Unit's demographics since 2014 are a positive reflection of the actions we have taken. The proportion of BAME staff is 17.2% by FTE, exceeding the University's 14% target. Recent appointments have been more representative of national demographic than previously. Since 2014 the proportion of all female staff by FTE has grown from 56% to 63%. Promotions reflect the gender balance of the School: 63% promoted were female, and a higher proportion of Grade 9 is now female (13/23) than in 2014 (6/13).

Other advances since REF2014 include better support for staff with caring responsibilities, including meetings being scheduled during core hours (10.00 to 16.00) wherever possible, a large increase in the number of staff with flexible working arrangements (e.g. compressed hours) to allow them to manage their work and family commitments more easily, and new baby-changing and breast-feeding facilities. The School also has dedicated space for prayer. The University is monitoring the impact of COVID-19 on research productivity of staff in different groups and is committed to this being taken into account in applications for probation, promotion, research leave and other similar decisions.

Training in D&I and unconscious bias is available to all researchers from PhD students to professors, and is required for all staff in leadership positions and members of appointment panels. In preparation for our submission, all decision-makers undertook this training. A UOA Lead was appointed through open competition and worked with the School Research Committee to ensure open review of outputs, which were read and ranked independently by a panel of 7 individuals (4 women, 3 men) following the process established in the University's Code of Practice. We reflected on the outcomes of the University's interim Equality Impact Assessment carried out at main panel level (2020) and bias analysis on the final pool (2021). No statistically significant differences for protected characteristics were identified through these processes. In the spirit of openness and transparency, all members of the UOA were given opportunity to comment on an early and a late draft of this environment statement.

3. Income, infrastructure and facilities

3.1 Income

Research spend has more than doubled over the assessment period (Figure 2), driven by the staff appointment and development strategies described in Section 2. Because our performance was stronger in the second half of the cycle, the total value of grants captured was higher than total spend. Total grant capture since January 2014 was £18.75m versus £13.85m spend since August 2013, and per Category-A FTE was £436,000. This is based on average FTE during the assessment period (42.96); we excluded staff returned to other UOAs and their income. We have been particularly successful in winning large grants with 12 awards of £500,000 or more, totalling £12.42m. These were from a broad range of funders – EIT Food, EPSRC, ERC, Jacobs Foundation, Leverhulme, MRC, NIHR, and UKRI Future Leaders.

Figure 2. Annual research spend over the REF period

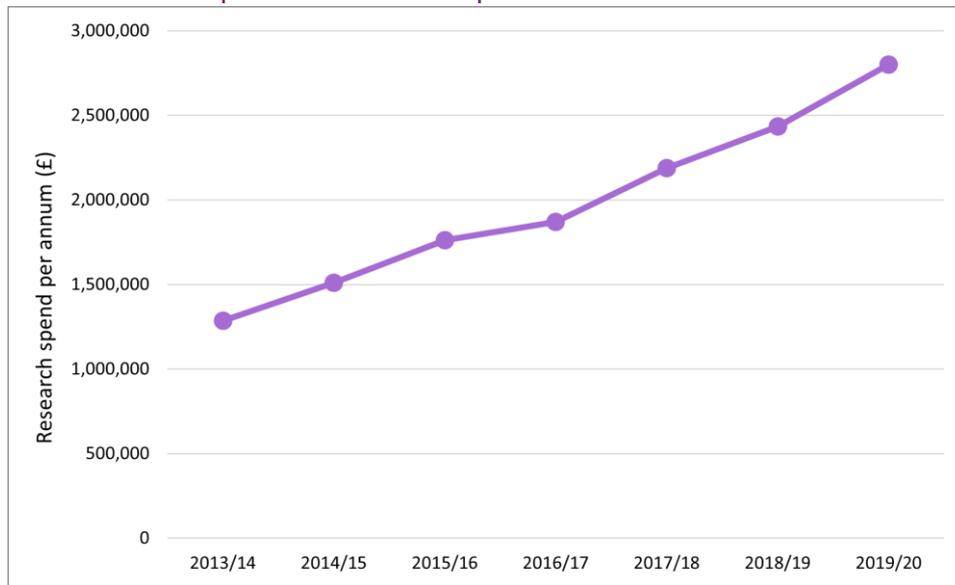
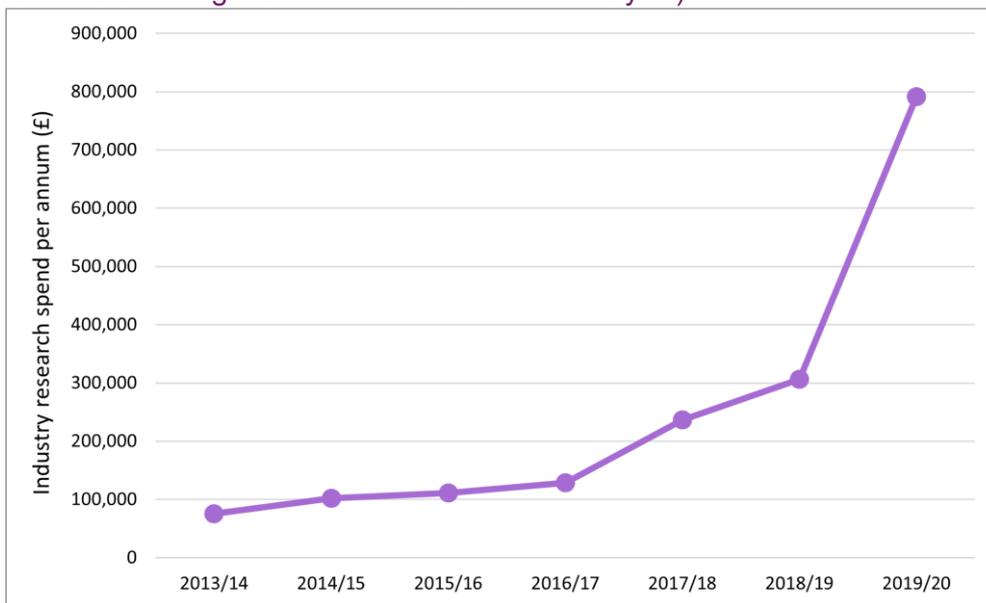


Figure 3. Annual research spend from industry over the REF period (sum of the 3 industry-related HESA source categories in the standard data analysis)



3.2 Outcomes from funding

Our research funding results in high-quality scientific outputs, evidenced by Figure 1, and drives our successful translation of basic research into impact. Noteworthy examples of scientific outputs include:

- Leverhulme grants to **Murayama** to study motivation and curiosity, resulted in high-profile papers reporting novel observations such as shared neural mechanisms between curiosity and hunger (*Nature Human Behaviour*), and the novel finding that people are willing to incur a cost to peek at counterfactual outcomes that have little utility and even have a negative emotional impact (*Psychological Science*).
- NIHR funding to **Reynolds** for the IMPACT trial showed that brief psychosocial intervention is as effective as CBT for depression, and saves money (*Lancet Psychiatry*).
- Two NIHR grants (**Creswell, Cooper**) contributed to the International Genes for Treatment Study; one paper established which forms of paediatric anxiety are associated with better or worse outcomes from CBT (*Journal of the American Academy of Child & Adolescent Psychiatry*).

A trend towards delivering more of our translational work through industrial collaboration and funding is evident in our early-stage impact work (Section 4.3). Grants also fund activities that have direct societal benefit (**Houston-Price's** EU-funded intervention to increase vegetable consumption in children has resulted in the *European Platform for See and Eat*). **Van Reekum's** EPSRC grant demonstrated the health and cognitive benefits for older people of riding both e-bikes and traditional bikes.

Our impact case studies were funded by a combination of external grants, School funds and University BOISP funding (see 1.5 and IES, Section 2.3). Externally funded were **Creswell's** childhood anxiety case study (MRC/NIHR) and **Williams' cannabis-based drug treatment for epilepsy** (GWPharma). Both **Cooper's** case study on book-sharing to support mother–child interactions in South Africa, and **Reynolds' Brief Behavioural Activation for adolescent depression** were funded through BOISP and the School; this enabled the **Cooper** case to leverage funding from charity (Mikhulu Child Development Trust).

3.3 Infrastructure and facilities

The School hosts large research facilities that are used by members of the whole University and benefits from strong investment in this infrastructure. In addition to the facilities described below, research clinics are central to our activities. For details of AnDY, Centre for Autism, and TVCTU see Section 1.3; the Speech and Language Therapy clinic, which also recruits patients to studies and contains specialist facilities is described in 4.2.

3.3.1 CINN and Reading Functional Imaging Facility (RFIF)

The Centre for Integrative Neuroscience and Neurodynamics (CINN) provides an interdisciplinary platform for neuroscience across the University, for which it receives dedicated funding as an IDRC (IES 2.2.1). This has led to successful collaborations between seven researchers within the School and fourteen researchers outside the School during the assessment period (e.g. with Philosophy on pain, with Pharmacy on dementia, and with Food & Nutritional Sciences on diet). The Reading Functional Imaging Facility (RFIF) is the physical infrastructure for neuroscience research, located in the School and used by the CINN community. RFIF was established in 2008 by a major University investment. Recognising that brain-imaging is a fast-moving and important field, the University invested in a £1.75m upgrade in 2016 and a 1.0 FTE MRI technician. Additionally, the School invests £275,000 p.a. (0.6 FTE of senior academic leadership, two support staff, MRI maintenance costs, and data storage). During the upgrade, the MRI scanner was modified to the latest version of the Siemens 3T Prisma Fit configuration and we support the necessary computing power required via three shared clusters: a dedicated VM platform with 70 CPUs, 630GB RAM, 60TB storage; a compute cluster with 2472 CPUs, 9TB RAM, 6 GPUs; an 11-node bespoke cluster with 23CPUs, 470GB RAM, 40TB storage, 8 GPUs.

The upgrade increased the potential for multimodal imaging and included MRI-compatible EEG and transcranial magnetic stimulation (TMS), and transcranial direct current stimulation equipment. This investment was instrumental in **Feredoes** winning a Leverhulme Trust Senior Fellowship for methodological development work on joint TMS-fMRI. Similarly, **Roesch** has won EPSRC funding to use joint EEG-fMRI and is developing novel analytical techniques for multimodal imaging.

CINN employs specialist staff to support researchers: a facilities manager, an MRI scanner technician, and a technician to assist with computing and data analysis. These staff are managed by the Director of CINN (**Christakou**, previously **Saddy**). To provide a Community of Practice for the complex data acquisition and analysis methods used in CINN, weekly Neuromethods meetings are held; these also oversee a study approval process.

This ongoing investment and support has elevated both our research culture and income streams. RFIF facilities are core to the research activities of a high proportion of our staff (19 of the 54 staff for whom we returned an output) with 21% (19/91) of our returned outputs involving MRI or other neuroscience methods. Usage of the MRI scanner is increasing, and total spend from grants on MRI scanning between 2016 and March 2020 (COVID-19 lockdown) was £533,000 (approx. 1300 hours). CINN grant capture has grown over this period, reaching £875,000 in 2019/20. CINN also makes a major contribution to our PhD programme, and students can conduct MRI studies in return for assisting other projects with data collection. This helps train researchers and pump-prime the next wave of funded projects. Seventeen doctorates were awarded for CINN research in the assessment period.

To increase our ability to study brain-body interactions and support collaborations with clinicians and other academic disciplines, we expanded our imaging capabilities to organs including the heart and liver, and muscle. Likewise, we added a Biolab with facilities to carry out basic medical examinations, phlebotomy, centrifugation and freezing of blood samples to -80°C; samples are analysed through collaborations with both Pharmacy and Food & Nutritional Sciences. This investment benefits PNAR researchers studying nutrition-brain interactions (**Chakrabarti**, **Field**, **Lampport**, **Williams**), and supported **Chakrabarti's** recent large ERC award to combine brain Magnetic Resonance Spectroscopy with gut and hormone measures. The School also supported set-up costs of a pain stimulation lab for use by **Salomons** and **Gandhi** in 2014 and this has recently been expanded for use in a 3-year commercially funded project (GENESIS, funded by Varian, >£500k) for pre-surgical pain assessments, in collaboration with RBFT.

3.3.2 Nutrition Unit

Used to facilitate our industrial collaborations, the Nutrition Unit contains a food preparation area (with strict health and safety procedures in place), extensive dedicated freezer space for storing foods and supplements, assessment facilities (blood-glucose levels, blood pressure, body mass index), eight cognitive-testing cubicles, and standardised cognitive and mental health test batteries. These facilities, and the methodological advantage of testing multiple participants in parallel at the same time of day, are also accessed by our industrial collaborators.

Specialist staff are available in the Nutrition Unit where research staff and PGRs are trained in phlebotomy. These staff are instrumental in integrating and training PhD, MSc and undergraduate students in nutrition research. The Unit provides an exceptional environment for PGR students, with 10 PhD graduates since 2014. The Unit, managed by **Lampport**, is used by five PIs in the School and facilitates interdisciplinary collaborations with Food & Nutritional Sciences, and externally with Birmingham, KCL, Leeds and Tufts University.

3.3.3 Software and online resources

We maintain several large databases of participants to support our research interests: children (from birth to school age); ageing (participants aged 60 plus); autism; aphasia; and undergraduate students. The University recently acquired REDCap to support in-clinic and online experiments; it stores sensitive participant data in accord with GDPR and acts as a hub to

allow experimenters to use a variety of other online platforms for experiments. With their prior experience, **Chakrabarti** and **Tavassoli** sit on the REDCap University management group.

To facilitate the larger sample sizes required by replicable research, we invested in online data collection tools from 2018, using the token-based Gorilla system as our main online experiment-building platform. Following lockdown in March 2020, support for online data collection became a priority, and we doubled our annual investment in Gorilla tokens, greatly expanding the number of online participants we could work with. At the same time, we established a £6,000 annual School Prolific fund to support PGR and Masters' online studies requiring specific demographic participation.

The University invests in specialist software licences to support research. MATLAB (with all Toolboxes) is used heavily across 17 labs and supports many grants and funded studentships. **Scarfe** teaches our MATLAB-based MSc module, and contributes to the research base with popular online tutorials for MATLAB and Psychtoolbox (one of the most widely used systems for generating experimental stimuli). This resource averages c.2500 active users per month and is used worldwide in research and teaching (e.g. Auckland, Cambridge, Cardiff, Essex, Michigan, Pennsylvania, St Andrews, Victoria and Vanderbilt University).

E-journal access expanded significantly since 2014 through University investments which secured eight major journal deals and aggregator packages.

3.3.4 Laboratories

Supporting collaboration, individual researchers maintain a diverse range of specialist laboratories which all staff can access, including: EEG/Psychophysiology for use with infants and young children (£60,000 investment); two large Virtual-Reality labs including full-body tracking; haptic virtual-reality; multiple eye-trackers including specialist eye-tracking for children and accommodation/vergence measurement; motion tracking; psychophysiology; a sound-proof room; perception labs; two preferential looking laboratories; clinical observation rooms with audio-visual recording; and 24 bookable testing cubicles with PCs. A University-funded mobile behavioural testing laboratory (BESS Lab, see IES, Section 4.4) is co-led by **McSorley**.

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

4.1 NHS partnership and training

Clinical training and clinical service provision are key elements of School activity, operating both in partnership with the NHS and independently, via the AnDY research clinic, the Centre for Autism and Speech and Language Therapy (SLT) clinics. The [Charlie Waller Institute](#) (CWI) is the largest of these, operating between the University, the [Charlie Waller Trust](#), and Berkshire Healthcare Foundation Trust and exemplifies how research in our School influences evidence-based practice and generates societal benefits. CWI is a flagship Health Education England commissioned training provider and employs 45 staff (9 clinical psychologists, 3 cognitive behavioural therapists and 33 other staff including project managers, clinical educators, assistant psychologists and sessional clinical supervisors) to support the delivery of professional training in evidence-based psychological treatments. These include adult IAPT (Improving Access to Psychological Therapies) and Education Mental Health Practitioner programmes. Academic leadership has been provided by **Reynolds**; research leadership is now provided by the newly appointed Charlie Waller Chair in Evidence-Based Psychological Treatment (Chan), with Dr Hannah Vickery as Director of Training. During the assessment period, CWI has trained 1400 students on credit-bearing courses and more than twice this number via CPD workshops. This includes over 200 therapists trained to deliver the Brief Behavioural Activation intervention for adolescent depression developed by **Reynolds** and submitted as an impact case study.

The three clinics provide a valuable service to the community as well as underpinning our fundamental-to-applied research agenda. The AnDY research clinic supports the training of NHS Children's Wellbeing Practitioners (13 in total, 9 have graduated) and provides placements for postgraduate students. Since 2014, as well as performing over 300 diagnostic assessments and

160 interventions, CFA has run 79 autism training workshops for professionals, employers and parents involving 1645 participants, many of whom have opted into research. The SLT clinics host both NHS and independent services for paediatric disorders of fluency (c.300 therapy sessions per annum) and provide NHS community clinics for adults with acquired communication disorders or voice problems (approx. 65 sessions per-annum). This clinical activity supports approximately 55 Health Education England (HEE) funded training placements per annum.

4.2 National and international sharing of expertise

Our clinical researchers influence national policy: **Creswell**, as academic adviser for NICE evidence standards; **Ho** as an external expert providing consultancy on Huntington's disease; and **Reynolds** on Brief Behavioural Activation treatment for adolescent depression. Staff advise the NHS or mental health charities on treatments (**Dodd, Jenkins, Stojanovik, Waite**); for example, **Jenkins** helped implement a guided self-help evidence-based treatment with the Berkshire Adult Eating Disorders service.

Our researchers also work with health and education services in other countries: **Chakrabarti** is Principal Research Advisor for a new £20m [autism residential community in India](#) while, in South Africa, the Western Cape Department of Health has adopted **Cooper** and **Murray**'s book-sharing programme, distributing one of their picture books to all new mothers together with guidelines for use.

Researchers in the School also advise the UK Government. **McCabe** is active in the pressure group DrugScience; her research on cannabinoids with Cowen (Oxford) has been used as evidence by the Advisory Council on the Misuse of Drugs (ACMD) in their advice to Government on changing the scheduling of cannabinoids to make it easier for scientists to study their effects, and to give clinicians the option to prescribe them for some medical conditions. **McCloy** works with the Food Standards Agency on the application of behavioural economics to food choice, and with DFID and Reading's Meteorology Department on climate change. **Creswell** was invited to produce a paper for the Cabinet Office on supporting parents of children and young people in CAMHS, and has an honorary contract with Public Health England. **Ellis** was a member of the Home Office Science Advisory Committee, representing Psychology/Behavioural Sciences. Other researchers take part in groups that aim to influence policy: for example, **Dodd** is Chair of the Oxford and Reading branch of the Association for Mental Health (ACAMH); **Pagnamenta** is active in a pressure group 'Bercow, 10 Years On Advisory Group', which lobbies government to improve Speech and Language Therapy Services.

4.3 Translation through partnerships

Our submitted impact cases are a subset of ongoing work to deliver societal benefits through collaboration with external partners. Table 3 outlines some of the projects within our impact pipeline.

Table 3. Impact case studies under development

Lead researcher	Focus	Partners
Chakrabarti	Developing apps for neurodevelopmental assessment in the home and low-resource settings. The START app for assessing autism received the jury prize across all categories in the international eHealth awards competition held in France (2018) and the best technical presentation award at the 11th International conference on Measuring Behaviour (Manchester, 2018). The group is currently trialling both START, and the STREAM app that assesses a wide range of neuro-developmental conditions, in India and Malawi	Therapy Box UK (a health technology company and winner of the Queen's award)

Unit-level environment template (REF5b)

Dodd	Developing an intervention to increase opportunities for adventurous play in schools, which Dodd has linked to reduced risk of developing mental health problems	Association of Play Industries; Play England, Play Wales and PlayBoard NI, HAGS; Learning through Landscapes, Outdoor Play and Learning
Glennerster	Understanding spatial representations underlying human navigation. This work could influence navigation systems used in autonomous vehicles in future (e.g. through the Oxford spin-out company FiveAI)	Government Defence Science and Technology Laboratory (DSTL), US Department of Defence, Oxford University Department of Engineering
Houston-Price	Bringing to market online and physical resources, including a library of e-books, to support parents in increasing children's vegetable consumption. Resources are currently available in 6 languages (www.seeandeat.org)	British Nutrition Foundation, Colruyt Retail Group, European Food Information Council, Universities of Helsinki, Turin, Warsaw
McCabe	Developing an alcohol-like drink that is less toxic and harmful	Alcarelle (https://alcarelle.com/); Professor David Nutt
Robson	Bringing to market a novel language and motor therapy product for stroke patients	Evolv (https://evolvrehab.com/)
Scarfe	Supporting remote operators to perform maintenance in radioactive environments, optimising remote visual-haptic telepresence systems	RACE (Remote Applications in Challenging Environments), RAIN (Robotics and AI in Nuclear), UK Atomic Energy Authority
Scarfe	Modifying consumer VR-headsets to make the experience more comfortable and immersive	Oculus Research (part of Facebook Reality Labs), Essex University
Stojanovik	Developing an intervention and accompanying parent manual to improve early communication skills in Down Syndrome	Berkshire and Oxfordshire Healthcare Foundation Trusts (to be delivered through NHS Language Therapy Services)
Ward	Aiding language fluency therapy, via development of new device and software	Respira Ltd (Innovate UK grant)
Waite	Developing a virtual-reality program for anxious adolescents	Oxford VR (Innovate UK grant)
Williams	Testing health claims for food items and nutritional interventions containing high levels of particular plant bioactives (e.g. flavonoids, ginsenosides) that aim to boost cognitive/brain function and mood (e.g. ThinkBlue™, Cereboost™, MegaNatural®)	British Summer Fruits Association, California Walnut Commission, Mushroom Council, Naturex, Polyphenolics Inc, Haskapa, Wild Blueberry Association of North America

4.4 Outreach, public understanding and citizen science

Much of our research is directed at benefitting end-users and this is reflected in our interactions with the public. For example, following the Personal and Public Involvement of Stakeholders model, the AnDY clinic involves young patients and parents in all stages of the research design process. During the COVID-19 pandemic, staff used their expertise to support the public: **Orchard** and teaching colleagues produced a MOOC on [supporting young people with low mood and depression](#) (20,000 sign-ups since May 2020), while **Dodd** and **Waite** co-wrote [a guide translated into 16 languages](#) for parents on dealing with children's worries in relation to COVID-19. Our main focus reflects our specialist knowledge of child and adolescent mental health, with numerous new articles and comments by **Dodd** on the anxiety-reducing importance of play during lockdown, featured widely in The Guardian, Sunday Times front page, BBC Radio 4, international media and the professional press.

A notable development in recent years is that, increasingly, members of the School share expertise through authorship of popular science and self-help books. **Creswell's** book for parents of children with anxiety disorders has been translated into Chinese, Farsi and Norwegian. She has also published an influential book for professionals on how to train parents

to use CBT with children. Astell published two books about care for people living with advanced dementia (one of which has been translated into German as a recommended text for nursing students), while Waite has published a guide to anxiety for family, friends, and professionals and is co-editing a self-help series for parents of children with common problems (four titles published, four in preparation). **Reynolds** has published a self-help book for depressed adolescents, and a guidebook for parents. As part of the See & Eat project **Houston-Price** has published a library of e-books for parents to encourage children to eat vegetables (with 24 titles to date, all translated into Danish, Dutch, Finnish, French, Italian, Polish). **Harvey** is writing a series of guides for people living with chronic health conditions; the first title, 'Living well with the menopause', was published in February 2021.

Staff regularly organise or feature in public-facing activities:

- **Houston-Price's** See & Eat project team organised a series of webinars in 2019/20, with more than 600 early years educators, health professionals and parents taking part.
- **Liu** organised a special event to celebrate musical talent in autism, bringing together 150 families/individuals with ASD, practitioners and researchers.
- The Centre for Autism runs biannual special interest groups with speakers drawn from NHS, charities, the University, and local schools (581 participants).
- Each year, the AnDY clinic organises an event for Mental Health Awareness week attracting c.200 parents and teachers.
- **Scarfe** worked with the European Space Agency's Rosetta Mission team to [visualise data from Comet 67P](#) in immersive virtual reality. This was presented at the 2016 Royal Society Summer Exhibition, where the public could 'walk' on the surface of the comet and interact with the Rosetta spacecraft.
- Staff have contributed to open online courses via the University's partnership with FutureLearn: [Superfoods: Myths and truth \(Field, EIT Food\)](#), [Understanding Low Mood and Depression in Young People \(Orchard and Lamport\)](#), [COVID-19: Helping Young People Manage Low Mood and Depression \(Orchard\)](#).
- **McCabe, McCloy, Pliatsikas, Riddell, Vogt**, make regular appearances in the media, and School staff gave 22 large or medium-sized lectures to the public, nationally and internationally.
- Many staff feature in popular YouTube videos, e.g. The Psychology of Babies (**Murray**, 12,623 views); a 3-minute PhD thesis competition winner about aphasia (Doedens, ~36,000 views).

4.5 Academic collaborations

We have a wide network of peers and partners and the number of international collaborations has grown since REF2014. 53% of the publications we report in Figure 1 have international co-authors compared to 32% in REF2014 (equivalent field-weighted comparison: 1.31 in this assessment period versus 1.05 previously). In addition to the Albert Wolters Visiting Professor programme (Section 2.2.1), we welcomed 57 academic visitors from other institutions (counting only those holding PhDs, and excluding Emeritus and former staff who maintained active links with the School). Many visitors were externally funded, for example, from the International British Academy Fellowship, China Scholarship Council, a Marie-Curie Fellowship and Erasmus. We have a mix of national and international speakers at our Thursday research seminars. Some collaborations are formalised as consortia, e.g. **Creswell** and **Waite** are members of the international [Genes for Treatment consortium](#), and **Chakrabarti** is a member the world's largest autism research consortium ([EU AIMS](#)).

4.6 Contributions to the sustainability of the research base

Staff in the School sit on 26 national or international committees. **Saddy** is Chair of ERC Starter grants SH4, 'The Human Mind and its complexity', while **Bojak** (2), **Chakrabarti**, **Ellis**, and **J.Hill** have been on national or European research council grant review panels during the assessment period, including ERC, HFSP, and Wellcome Trust. Members of the Unit have held senior editor/associate editor positions on 33 journals and 5 special issues during the assessment period.

Members of the Unit are respected and influential in the field and have been recipients of many awards and invitations. **Chakrabarti** won the Philip Leverhulme Prize in 2015 (£100,000), and in 2019 was nominated to the Young Academy of Europe; **Murayama** has won 7 prestigious prizes including the FJ McGuigan (American Psychological Foundation) Early Career Investigator Prize in 2016 (\$25,000), and is a Distinguished Guest Professor at the University of Tübingen; **Creswell** has won several awards, including the British Medical Association (BMA) President's award; in 2016, **Cooper** was elected as a Fellow of the British Academy; **Ellis** is a Fellow of the BPS, and of the Academy of Social Science; **McCabe** won the British Association for Psychopharmacology In Vivo Award in 2014 and 2015, and was invited to the Japan Frontiers in Science meeting in Tokyo in 2019, funded by The Royal Society; in 2019, as mentioned above, the British Pharmacological Society awarded **Williams** the 2019 Sir James Black Award for Contributions to Drug Discovery for her work with cannabinoids, which and was runner-up in the 2020 Guardian University Awards Research Impact Category.

Members of staff have given 76 keynotes and prominent invited talks (excluding departmental seminars, minor meetings, etc.), and we have organised the following conferences and annual meetings at Reading and elsewhere:

- **Reading Emotions** is a yearly flagship conference for PAN (founded in 2014 by **Chakrabarti, Christakou, Johnstone** and **Van Reekum**). It attracts high-profile international speakers such as BJ Casey, Richie Davidson, Karl Friston, Russ Poldrack, Essi Viding and is now considered a key event in the field. A positive outcome of moving online in 2020 was much-increased attendance (500+) and international reach (34 countries).
- **Conference on Multilingualism** (COM2020) organised through CeLM, moved online in 2020 and experienced boosted attendance (614 delegates from 64 countries).
- **Gray** and **Riddell** organised the Experimental Psychology Society summer meeting at Reading in 2017, with **Chakrabarti** contributing the symposium 'Social Perception and its Atypicalities'.
- **Chakrabarti** and **Tavassoli** chaired the 2019 meeting of the Autistica Discover conference at Reading, the largest UK autism conference, with 400 delegates.
- In 2017, **Creswell** and **Waite** hosted the 'Evidence Based Mental Health in Schools' Conference (400 delegates), co-sponsored by the Charlie Waller Memorial Trust.
- In 2016, **Bojak** organised the largest international neuroinformatics conference of the year (300 attendees, INCF Congress).
- CINN funds and organises three annual neuroscience workshops and symposia at Reading for national and international participants.
- Smaller events, such as the 'Meeting of Motivation Researchers in the UK' organised by **Vogt**, are common in the School.

4.7 Responsiveness to national and international priorities

Our research is aligned with many national and international priorities, most clearly evidenced by our work in childhood and adolescent mental health ([WHO Comprehensive Mental Health Action Plan 2013-2020](#)). We have contributed to national priorities, in both planned and responsive work, as illustrated by **Dodd's** work to prevent anxiety and depression in children through promoting a more adventurous style of play, and work across the School during the COVID-19 pandemic to support the mental health of children and young people (**Dodd, Orchard, Waite**). At an international level, **Chakrabarti's** work on developing scalable digital neurodevelopmental assessments in India and Malawi, and **Murray** and **Cooper's** work on improving children's learning and development through book-sharing in Africa illustrate our response to challenges in low-resource settings. More recently, in response to UKRI calls our nutrition researchers are focusing on the challenge of [improving mental health and wellbeing through diet](#) in the UK.