

Institution: University of Birmingham
Unit of Assessment: 4 – Psychology, Psychiatry and Neuroscience
<p>1. Unit context and structure, research and impact strategy</p> <p>Structure of research across the submitted unit</p> <p>UoA4 research is hosted within the School of Psychology, which is one of 4 Schools in the College of Life and Environmental Sciences [REF5a 1]. Our ambition is to foster a distinctive and inclusive environment that delivers transformative research. We do this by integrating discovery and translation science, working at multiple levels of analysis from single neurons and neural systems, through individual behaviours and cognitive processes, and extending to the social systems and structures in which they operate. Our research themes and centres ensure that we deliver at all these levels, provide support for individuals and teams, and focus and coherence for strategic activities.</p> <p>We believe that novelty and innovation stem from nurturing individual talent and research visions and facilitating interactions among colleagues with complementary interests. We achieve this through our 4 research themes: 1) Language, Interaction and Social Cognition; 2) Memory and Attention; 3) Mental Health and Wellbeing; and 4) Perception, Cognition and Action. All academic staff are affiliated with at least one theme.</p> <p>In parallel with our themes, we operate within a strategic plan to ensure we are positioned to respond to national and international trends and priorities in research and funding. Our research centres articulate this plan, enabling us to connect with researchers across the University to form interdisciplinary hubs, to join up discovery, translation and impact, and to give us the capacity and visibility to attract large-scale funding to conduct long-term programmes of research. The 4 research centres we lead are: the Centre for Human Brain Health (CHBH); the Institute for Mental Health (IMH); the Centre for Applied Psychology (CAP) and the Centre for Developmental Science (CDS). These centres have benefitted from significant College and University strategic investment funding (exceeding £24M) [REF5a 4.2.1 & 4.2.3].</p> <p>We believe that a vibrant and stimulating research environment is underpinned by an inclusive, equitable and supportive culture where everyone feels able and welcome to contribute. Our research themes facilitate both “top-down” and “bottom-up” input to strategy from staff members via theme leads who coordinate theme activities and sit on our School Research and Knowledge Transfer (RKT) committee. Our current profile of staff on teaching and research and research only contracts includes 49.6% women and 10.4% staff from BAME backgrounds. We received a Bronze Athena SWAN award in 2012 which was renewed in 2017. Equality, Diversity, and Inclusion (EDI) in our School is led by our Director for People and Culture (<i>Beck</i>). Promotion of a positive and inclusive environment for our entire community is embedded in all operational and decision-making activities. The terms of reference of all School Committees include a requirement to monitor and evaluate all activities through this lens. EDI events such as Women in Science, Black History Month and LGBT+ and BAME network meetings [REF5a 3.4.5] are regularly highlighted in School communications ensuring that updates and School highlights capture the full range of actions and behaviours that we value. A successful initiative from our undergraduate EDI representatives was a “Women in Science” session, as part of the School’s Annual Research Event, which attracted around 60 attendees. The Women in Science session is now a regular part of our Research Event. We also provide leadership within the University on EDI (e.g. <i>Beck</i> is College EDI lead, <i>Flowe</i> is co-lead for the Institute for Global Innovation Gender [REF5a 2.3] Inequality Theme) and outside the University (<i>Wilding</i> sits on the Advance HE Athena SWAN Governance Committee and <i>Powell</i> (Head of Clinical Psychology) chairs the West Midlands Diversity in Clinical Psychology group).</p>

Achievement of strategic aims for research and impact during the assessment period

We have achieved our 4 key strategic aims set out in 2014:

1) *To Invest in new infrastructure and accommodation*

The University invested £22.6M to relocate the School to a refurbished building [REF5a 4.2.1] and to build the CHBH [REF5a 4.2.3]. The first phase of the move is complete and the final move to relocate all members of staff is set for 2022. The CHBH currently comprises 50 Principal Investigators who have access to a new Siemens 3T MR scanner, a new MEG scanner, and dedicated laboratories for developing optically pumped magnetometers (OPMs), infra-red imaging (FNIRS), TMS/TES and EEG. Investment in critical infrastructure has facilitated strategic appointments and is enabling breakthrough research on the neuronal oscillatory dynamics supporting cognition e.g. the appointment of *Jensen*, a world leader in the use of MEG to study brain oscillations (one of the **top 1% most-cited scientists in 2020**) has significantly extended our brain imaging capabilities. He has overseen development of a software pipeline “FLUX” for state-of-the-art analysis of MEG and EEG data and OPM development (supported by a £900K BBSRC grant and an £800K Quantum Hub Partnership Resource Award from EPSRC).

2) *To stay at the forefront of developing neuroimaging and electrophysiological techniques*

Building on existing expertise in EEG and fMRI (*Bagshaw, Hansen, Mayhew, Mazaheri, Rotshtein*), recent strategic appointments are sustaining our use of state-of-the art brain imaging (e.g. *Chechlac, Park*) and brain stimulation techniques (*Brittain, Hickey*), with a focus on the use of advanced time-frequency methods to study brain oscillations (*Hanslmayr Staresina, Wimber*). Strategic appointments have also been made in machine learning and computational modelling (*Apps, Brett, Charest, Lockwood*). There have been significant awards to support this work e.g. *Charest, Hanslmayr, Hickey and Wimber*, were awarded ERC grants averaging £1.1M each. *Staresina* is a Sir Henry Dale Fellow and has recently been awarded an ERC Consolidator grant (~£1.8M), *Apps* is a BBSRC David Phillips Fellow and *Lockwood* an MRC Fellow.

3) *To establish cross-University collaborations*

The establishment of the **IMH** has provided a focus for cross-University collaborations that capitalize on our strengths in basic neuroscience and mental health, supported by strategic investment from the University totalling £2.3M, enabling appointments into the School (e.g. *Broome, Day, Michail, Marwaha, Rogers, Upthegrove*). This has facilitated success in securing over £10M of new awards since 2016 (around £6M won by members of the school) for projects with a distinctive focus on youth mental health that involve cross-college collaboration e.g. the clinical and cost-effectiveness of Stimulant compared with Non-stimulant medication for adults with Attention-deficit /hyperactivity disorder and a history of Psychosis or bi-Polar disorder (*Marwaha*, £1.9M) is a collaboration with the University’s clinical trials unit and Applied Health Institute. Researchers in the **CAP** are leading on collaborations that span all five colleges in the university e.g. The Centre for Crime, Justice and Policing includes experts from Business, Law, Psychology, Nursing, Computer Science and Social Policy (Co-Director *Woodhams* £1.2 M) and the Rights for Time network (PI *Flowe* £2.2M GCRF) brings together an intersectoral team from English, Sociology, Law and Psychology. We have strategically recruited to areas of strength in **CHBH**, which provides a hub for University-wide collaboration in imaging methods, and expertise in neural oscillations, memory and attention (e.g. *Hickey, Jensen, Mazaheri, Park, Van Zoest*) and translation of novel treatments e.g. for minimally conscious patients (*Cruse and Fernández-Espejo*).

4) *To capitalise on growing strength in cognition and development across the lifespan.*

Building on our expertise in multiple facets of human development, we have established a new Centre for Developmental Science (**CDS**) and targeted appointments to foster critical mass in research into typical development (from infancy to old age: *Bremner*;

Burnett Heyes, Devine, Segaert, Chechlacz) and in neurodevelopmental disorders (*Richards, Surtees, Woodcock*). A distinction of the centre is the application of developmental theory and methods to study change across the lifespan. CDS also provides a rich new setting for the next phase of the Cerebra Centre for Neurodevelopmental Disorders, recently awarded continued funding (£850K) from Cerebra. CDS aligns with the emphasis of IMH on mental health in adolescents and young adults, and we expect the two centres to work closely.

Future strategic aims and goals for research and impact

Our strategic aim over the next 5 years is to capitalise on the significant investment we have received from the University and from external sources to lead on research that **integrates discovery, translational, and applied science to maximise impact**.

Our focus will be on 3 key areas:

Our first aim is to support activities that facilitate the **translation of basic research into applications** that influence policy and practice as well as activities that help **orient discovery science to questions of relevance beyond the laboratory**. Underpinning this strategy is research that involves end-users at an early stage and co-creation of research with stakeholders. We will learn from our existing successful relationships with third sector and NHS and Forensic partners, and user panels, to achieve mutually beneficial long-term relationships with end users to generate high quality, impactful research. The work funded by Cerebra, as outlined in our impact case study, exemplifies this approach, and is based on strong links with support groups, NHS Trusts and schools.

Second, we will diversify our sources of income, and secure the means to host **large scale research projects and centres**. This will include funding for imaging technologies to ensure sustainability of the CHBH. We are capitalising on links with our College of Engineering and Physical Sciences to develop new methodologies (optically pumped magnetometers; near-infrared imaging). Working with **NHS partners** is enabling success with NIHR funding (over £4M awarded to members of the School since 2017). Building critical mass in research into development across the lifespan and the establishment of a new **Centre for Developmental Science** has put us in a position to bid for larger-scale support in this area.

Third, we will build on existing excellence in **interdisciplinary research that meets global challenges** such as **crime and data science and mental health and well-being**. We will strengthen structural support and interdisciplinary links to Schools within our College and with other Colleges within the University, by capitalising on new opportunities for co-location of facilities in the refurbished Gisbert Kapp building (due in 2022). We are developing a shared research space with the School of Sport, Exercise & Rehabilitation Sciences around research on mental and physical well-being, including a clinical research facility. We will also build on current expertise in computational neuroscience via our engagement with the **Alan Turing Institute** [REF5a 2.1.5]. Elected **Turing Fellow Brett** is working with the Institute on projects around the teaching of data science. We are promoting a model for PhD training based on supervisory teams of academics from at least two different disciplines as well as an external partner and have used this model in recent applications for doctoral training schools.

Enabling research impact

We enable impact by creating an environment in which all investigators think about the impact of their research at the start of their programmes. **Discussion of impact is part of the annual staff review process** [REF5a 3.4.3]. We are successfully drawing down institutional funding for impact acceleration (e.g. over 220K in UKRI Impact Acceleration Awards). We also **disseminate good practice**, for example, the IMH organised a session at the University research conference in 2019 on Transforming Research in Youth Mental Health.

Impact is a **key strategic focus for all four research centres** and is deeply embedded in ways of working within the IMH and CAP. The IMH has a Youth Advisory Group in which young people help create and shape research e.g., via one-to-one consultations with researchers about proposed research and discussions at the IMH Research Strategy Meetings. CAP focuses on real-world application of evidence that is achieved through consultancy and engagement with stakeholders, as exemplified by the independent evaluation of policing interventions programme funded by the College of Policing (CI *Woodhams* £667K). Translation of on-going research to impact policy and practice is supported by **direct links between researchers and practitioners** e.g. the Leverhulme funded international academic-policing practitioner network C-LINK led by *Woodhams* and the recent ESRC award to *Colloff* for research on harnessing metacognition to assess the accuracy of memory reports from children in the Criminal Justice System. CAP also supports the needs of practitioners, providing training that leads to sustainable knowledge exchange. For example, researchers have worked with the Norfolk and Suffolk Constabularies and Police and Crime Commissioners on a programme “Development and Training in Evidence-Based Policing”.

The success of this strategy to invest in support for impact across our School is reflected in our diverse set of case studies. These are drawn from Psychiatry (*Birchwood/Upthegrove*), Clinical Psychology (*Oliver*), Addiction and Community Psychology (*Orford*), Forensic Psychology (*Woodhams*) and Cognitive science (*Raymond*). Additional evidence is provided by our ability to attract new talent and funding in applied psychology e.g. AXA postdoctoral fellowship awarded to *Duran* and *Woodhams*.

In addition to mature programmes of impactful work, we are actively developing impact in the area of prevention of self-harm (*Michail*) and the challenges of identifying and classifying child sexual abuse material (*Kloess*). Work on disorders of consciousness by *Cruse and Fernández-Espejo* is being translated into the development of biomarkers to be used in clinical settings. The School impact lead is working with recent appointment *Day* who is the government’s new Drug Recovery Champion to support work on the best treatment for those recovering from drug misuse. Support from the ESRC-IAA User Engagement Fund is allowing us to develop an attention training programme in schools for children with autism spectrum disorder (*Mervorach* in collaboration with *Kossyvaki*, from the School of Education).

Supporting interdisciplinary research

Supporting interdisciplinarity is a key element of our research strategy. We are leading on a number of international interdisciplinary collaborations including: the Global Research Challenge funded #Rights4time research network, which consists of multiple projects across Kenya, Jordan, Lebanon, Palestine and Rwanda on humanitarian protection, human rights policy and practice; and a multimodal neuroimaging research network funded by the strategic partnership between the University of Birmingham and the University of Illinois at Urbana-Champaign [REF5a 2.1.8].

Our four research themes are broader than traditional “topic” boundaries and the **interdisciplinary culture** in the school is underscored by the fact that many research projects cut across themes and centres e.g. ESRC funded project to *Wimber* (Memory and attention theme) and *Apperly* (Language, Interaction and Social Cognition theme), and a recent ESRC award to study the effects of sleep deprivation on social cognition to *Surtees* (CAP) and *Bagshaw* (CHBH).

A key strand of our commitment to developing interdisciplinary research has been the establishment of the IMH and CHBH and strengthening of support for the CAP, all of which are interdisciplinary in nature, comprising members from disciplines and colleges across the University. The CHBH Steering Committee includes representation across the University (Computer Science, Physics and Astronomy, SportExR and the Institute of Cancer and Genomic Sciences) and from the University Hospital Birmingham. The IMH also brings together researchers from multiple disciplines (e.g. neuroscience, clinical sciences, philosophy, and sociology). Also affiliated with the CAP are educational psychologists from the School of

Education and the University's occupational psychologists from People and Organisational Development (POD) and researchers in the College of Social Sciences [REF5a 1].

The School has played a central role in projects supported by the University's **Institute of Advanced Studies (IAS)** and **Institute for Global Innovation (IGI)** [REF5a 2.3]. The IGI has a specific mission to bring interdisciplinary teams together to tackle the world's most pressing challenges. The School is leading on the IGI theme of **21st Century Transnational Crime and involved in the Resilient Cities Theme** (*Broome*). The School is hosting Global Challenges PhD Scholars in Mental Health and Wellbeing, which involve joint supervision of students across different Colleges. Several UoA4 researchers (e.g. *Broome, Michail, Shapiro; Woodhams*) have led Institute of Advanced Studies (IAS) interdisciplinary workshops, we have hosted an IAS Vanguard Interdisciplinary Research Fellow and been awarded Wellcome Trust Institutional Strategic Support Fund (ISSF) funding for interdisciplinary collaborations (e.g. to *Segaert* in collaboration with Lucas from Sorter for a project on physical fitness and language decline in ageing).

Open research

The **open science** movement has been strongly driven by researchers in psychological science and neuroscience, including researchers in our school. We are leading on open science best practice: *Rotshtein* is a founding Editor for registered reports at the journal *Cortex*. She is a member of the Open Science Framework: Registered-reports international steering committee and has given key notes on open science e.g. LiveMEEG in 2020 and at the European Association of Science Editors conference in 2016. *Brett* has been involved in open code initiatives including software projects for functional brain imaging e.g. creator of the Marsbar toolbox for brain imaging data. CHBH has developed an open science web site and video to promote best practices: <https://www.birmingham.ac.uk/research/centre-human-brain-health/open-science.aspx>. Throughout the REF period we have focussed on spreading best practice, removing barriers to adoption of open science, and institutionalising compliance with core principles.

In 2018, a School working group on open research organised a series of seminars led by experts in the School and these have now become a regular feature of our school quarterly Research Sessions. We are also building open science best practice into our education programmes: writing a pre-registration of research methods and analytic plans is a requirement of our MSc research programme, and we plan to extend this to require pre-registration of at least one study in each PhD.

All peer-reviewed publications at point of acceptance irrespective of format are entered into the PURE data management system thereby ensuring our research is open to the public via Green self-archiving of all research outputs. We draw on institutional funds to support publication of GOLD open access publication for UKRI funded work and publication in fully open access journals [REF5a 2.2]. We benefit from agreements with major publishing houses to reduce or remove open-access fees. Open data storage is common practice in the School and there is support via Library Services for the discovery and re-use of existing data sets and for researchers managing their own data.

Research integrity

All research in the School is held to the highest standards of **governance** and we have rigorous processes to ensure that **ethical review** meets both local and external ethical criteria (processes overseen by the School RKT committee and guided by the University Code of Practice for Research). There is a School ethical review process for evaluation of Undergraduate and taught postgraduate research. Staff and PGR projects are reviewed via a University-level ethical review processes overseen by the University Research Governance, Ethics, and Integrity Team [REF5a 2.2]. A Research Misconduct and Whistle-Blowing Policy and Procedure further ensures research integrity is maintained. Oversight of Health and Safety for research is provided by the

School Health and Safety Committee, whose chair reports to the College level Health and Safety Committee. Research involving clinical populations or NHS facilities is subject to NHS ethical review and support is provided for clinical trials/psychopharmacology studies by the University Clinical Research Compliance Team and Research Governance, Ethics, and Integrity team. Research involving laboratory animals is subject to the University ethical committee and Home Office licence. Other work is reviewed by the University's STEM ethics committee, comprised of academics (including UoA4 staff) and lay members. Currently 10 members of the School act as reviewers and provide advice on policy and practice.

2. People

Staffing and recruitment policy

Our ability to attract, appoint, develop, reward, and retain academic staff of the highest calibre, guided by our staffing strategy, has been central to the achievement of our research objectives. Since 2014 the number of faculty on contracts with a research and teaching component has risen by 20%. All category A eligible staff are on long-term open-ended contracts. The profile of teaching and research and research only staff at each grade is: 19.7% Research Staff; 28.2% Lecturer; 23.9% Senior Lecturer; 8.5% Reader; 19.7% Professor. We have 6 staff whose contracts are split between University and external services, e.g. NHS or forensic services. These staff bring expertise in translational research, maintain active collaborations with end users of research, and frequently collaborate on the development and evaluation of new interventions, treatments, or policies. Clinical academics (*Broome, Upthegrove, Marwaha, Day, Surtees, Mallikarjun*) are fully embedded in research themes/centres.

Sustainability of our staff structure is underpinned by maintaining a balance between experienced and early career researchers within each of our research themes. Our strategy is to recruit in areas of research that complement existing strengths and expertise, to ensure development, retention, and promotion of staff. The CHBH has provided a focus for attracting staff with expertise in cutting edge neuroscience methods (*Jensen* as Professor; *Mazaheri, Brittain, Hickey*, as SL; and *Brett, Charest* as L). Other appointments have been directed at facilitating translational neuroscience (e.g. *Day, Cruse and Fernández-Espejo, van Zoest, Apps, Lockwood*) and research on youth mental health (*Broome, Marwaha, Mallikarjun, Michail, Rogers, Upthegrove*). Strategic new appointments have enabled us to extend the work of CAP to applied cognition (*Flowe and Colloff*) and build on strengths in sexual offending research (*Kloess*). We have recruited specifically to build strength and diversity in other key areas of activity including development across the lifespan (*Bremner, Burnett-Heyes, Devine and Sogaert*) and neurodevelopmental disorders (*Woodcock, Richards, Surtees*).

The **Birmingham Fellows scheme** [REF5a 3.4.1] provides five years of enhanced research time with Fellows graduating to Lecturer or Senior Lecturer position at the end. We have recruited four outstanding researchers to this Scheme during the REF period in key areas of strength: social cognition (*Cook*), youth mental health (*Michail*), neural mechanisms associated with human speech (*Park*) and the neural mechanisms underlying episodic memory (*Staresina*). These researchers have extended and complement our research base, meaning that we can offer excellent support for their career development. We were also awarded a Birmingham-Illinois Partnership for Discovery, Engagement and Education (**BRIDGE**) fellowship [REF5a 3.4.1] (*Chechlacz*). Recent early career appointments have been successful in attracting research funding (over £6.5 Million in grants). We have also been able to attract senior talent to complement existing strengths in youth mental health via the **Birmingham Professorial Research Fellows scheme** [REF5a 3.4.1], which allows for protected research time for the first 3 years in post (*Marwaha*).

As part of our commitment to EDI in recruitment, we use inclusive language in all our advertisements along with reference to our Athena SWAN Bronze Award and the University's position as a Stonewall Diversity Champion [REF5a 3.4.5]. Other activities include encouraging

applicants from underrepresented groups (e.g. BAME backgrounds) and targeting potential female candidates through subject networks. We have facilitated the interview process for families with young children. Our processes include providing private spaces to care for infants, booking of appropriate family accommodation, and assurance to applicants that evening hospitality is optional. Since making these changes we have seen a 320% increase in female applicants since 2015, and a 111% increase in females shortlisted. As positions become available, we are seeking to increase the diversity of all our academic staff in relation to all protected characteristics.

Equality and diversity in selection of outputs

Equality and Diversity issues have been a priority in constructing our REF submission and informed all our processes. All staff with research responsibility have been involved in the internal output reviewing process. In line with the University REF code of practice, a School-level output selection panel was convened to review the selection of outputs and to examine representativeness by gender, BAME, part/full-time status and career stage. This equality impact assessment did not reveal any biases in the attribution of papers from the overall pool of publications. Our output selection is an appropriate representation across these categories and reflects the diversity of our research Unit. The distribution of outputs across the 4 research groups is: 21%/25%/25%/29%.

Staff development strategy and culture

Induction and training

The School **induction process** checklist ensures that all key information is covered, and introductory meetings are scheduled with the Head of School (HoS) and other lead members of the School (e.g. Head of Research, Head of Education). All new staff attend the University-level induction [REF5a 3.4.2] and are required to complete equality and diversity training as well as training on Data Protection; Information Security; Fire awareness and Health and Safety.

We encourage staff to develop their leadership skills via engagement with University flagship training programmes: **Senior Leaders Programme** (for staff who may be about to take up a greater formal leadership role), **Emerging Leaders Programme** (for staff who are already contributing to leadership and who wish to develop their capabilities further) and **Research Leaders** (for senior researchers) and the programme for **Developing as a research team leader** (for ECRs) [REF5a 3.4.4]; 18 Psychology staff have participated in these programmes. Three staff have participated in the **AURORA leadership programme** (Advance HE's leadership development initiative for those who identify as a woman).

Within our School we run 3 workshops a year on topics suggested by the People and Culture Committee including CV planning, promotion, collaboration, impact generation, career development and managing research alongside other life demands. Staff also attend research training courses run by the College (e.g. Future Fellows Programme) or by the University POD team.

Performance and development review

The Birmingham annual appraisal scheme is called the Performance and Development Review (PDR) [REF5a 3.4.3]. PDR reviewers discuss career planning, training, and promotion (including leadership development, career breaks and study leave). The PDR also includes a discussion of plans for attracting research funding, achieving and extending impact, and provides a mechanism to alert the Head of School to any barriers to progress. To ensure consistency in the process, experiences are shared among reviewers in pre- and post- PDR meetings. A separate PDR process for Research staff is conducted by a member of staff who is not their PI, with a focus on career development. In annual progress review, reviewers explicitly encourage inclusivity when discussing promotion and training. In the 2019-20 cycle, female staff at each level (L, SL and Reader) level were actively encouraged to apply for promotion where appropriate.

Probation

The usual probationary period for academic staff is three years. During the first month of the appointment the HoS works with the probationer to define a Probationary Personal Development Plan (PPDP). The planning involves agreement between the probationer and HoS on a clear statement of appropriate objectives and formulation of a detailed and practical development plan, which is approved by the Head of College. The probationer has a review with the Head of School at least once a year, including a review of progress towards the objectives and development activity. Probationary staff are assigned a mentor with whom they must meet at least 3 times a year.

Workload management

The School uses a workload allocation model, which allows for fair comparisons and allocations in supporting all staff. Our model provides ring-fenced time to develop and extend impact and credits citizenship activities which explicitly include outreach.

We are committed to flexible and remote working to support equality and diversity as well as staff wellbeing. All staff are encouraged to make requests for part time working arrangements/ flexible working should they need them: 22% of staff with a research role currently work part time. Seven colleagues currently make use of flexible arrangements, including 1 male and 1 female professor and 5 lecturers (3 female, 2 male). All meetings and the monthly School research seminars, to which leading external researchers are invited to speak, are held in family-friendly core hours (between 10am - 4 pm). School Away Days run between 9:30 and 4pm.

Our school policy is that all our committees have at least 2 male and 2 female members. We have 53% male and 47% female representation on committees. Seven of the twelve committees in the School have female chairs. Most members of committees are there because of their administrative duties. Thus, committee membership reflects the allocation of these duties in the light of School needs and PDR recommendations. Committee overload is avoided by spreading the workload and is monitored via the workload model and the PDR process. There is also equal representation of men and women as research theme (co)leads. In addition, as part of our progression planning, we have actively sought early/mid-career faculty for these roles, and they are mentored by senior colleagues.

Parental and adoption leave

A clear process has been drawn up to clarify the roles of the HoS, dHoS, and EDI Lead in supporting return to work after **maternity/paternity/adoption leave and shared parental leave** [REF5a 3.4.5]. A parental/adoption leave pack, available to all staff, sets out the process. Since 2014, the University has provided funding to cover faculty leave and now matches enhanced pay for Shared Parental Leave with Maternity leave. During leave, staff know that they can but are not obliged to use Keeping in Touch days to maintain contact. When staff with responsibilities for research return to work, they have teaching and admin duties reduced by one-third for a term to help them to focus on their research; temporary staff appointments ensure the burden is not spread to others. We have had 2 men take shared parental leave during the REF period. Staff returning to work after parental leave have priority for pump priming funds.

Promotions

Formal announcements by email invite staff to consider promotion, including links to the University process [REF5a 3.4.6]. PDR reviewers flag individuals they believe are working at the next level and the HoS follows up by encouraging these staff members to apply for promotion. To assist staff in preparing for a promotion application the EDI lead holds **shared resources** of successful applications that can be accessed by any member of staff. A School panel makes recommendations on whether an application will be supported and put to the College panel, and, if approved, the University panel. We are committed to EDI in the promotions process and this information is stated clearly in the documentation. The career pathways for **part-time** staff are equivalent to full-time staff. Impact has equal importance to blue-sky research, and this is reflected in the promotion criteria with examples within the School where staff have been promoted primarily on impact. The last four internal promotions to professor were women, and

women occupy prominent senior leadership positions e.g. EDI lead (*Beck*) and Director of Postgraduate Studies (*Thompson*). The dHoS role was held by women from 2013-2017 (*Beck* and *Higgs*). In the 2019-20 cycle the School considered 9 colleagues for promotion (4 female, 5 male): 4 female and 2 male applicants were then considered by the College promotions team, all of whom were confirmed by the University.

Study leave

All staff may apply for study leave [REF5a 3.4.3] and this is encouraged by an annual email from the HoS. Study leave is taken roughly equally by men and women (11 women and 14 men since 2015). Our organisation of teaching means that it is straightforward for most staff to take one semester of study leave, during which they have no administrative responsibilities and no teaching. Study leave may be granted at the rate of one term after completion of each three-year period of service. The EDI lead holds copies of successful study leave applications available to any interested applicants. Applications are considered by HoS and Head of College. Travel during study leave is not an expectation, making study leave open to those with family commitments, but a plan of work e.g. towards grant applications is expected. e.g. *Higgs* visited the University of New South Wales which resulted in a successful grant application to ESRC and *Apperly* wrote a recently funded ESRC application during a period of study leave. Staff are required to submit a short report following their leave.

Specific support for Early Career Researchers (ECRs)

The School has a strong record of early career Research Fellows (RFs) and lecturers gaining their own funding and independent fellowships, including ERC Starting grants, UKRI Research fellowships and Marie Curie Awards. ECRs have been successful in applying for Wellcome Investing in People awards, and Universitas 21 awards to gain experience in other laboratories.

Early Career Lecturers with research as part of their contract have a reduced teaching and administration workload over their first two years, and continue to take fewer undergraduate project students than established staff while they remain on probation in order to assist with establishment of their research.

RFs have access to a mentor and grant writing support. School level funding supports conference attendance, pilot work and impact events for RFs and they are encouraged to take on limited teaching responsibilities – supervising a project student or a guest lecture in their area of expertise – to gain experience useful for when applying for tenured posts.

Our University provides support for ECRs via the Postdoctoral / Early Researcher Career Development and Training (PERCAT) scheme [REF5a 3.3]; PERCAT runs an Annual Research Gala, Master classes, Writing workshops, Careers Seminars, and an Annual Athena SWAN themed event (since 2016): “From PERCAT to Professor” (2016), “Handling non-academic problems in the academic environment” (2017) that have been attended by RFs from the school.

A School Research Staff committee represents the interests of all ECRs on research only contracts and organises social activities, and the chair of this committee reports to the School Committee and sits on the School RKT committee. ECRs are consulted on new appointments and other strategic matters and can invite School Seminar speakers via the Research Groups. We allocate School funds to bring in prestigious international female speakers to the School Research Seminars and we have a policy of inviting and prioritising seminar questions from ECRs.

Supporting wellbeing

In addition to University level wellbeing services and initiatives [REF5a 3.4.5], at School level we have introduced regular events to raise awareness of the importance of physical and mental self-care and **promote and maintain a healthy work-life balance** for staff and students. Specific events include community-building experiences, such as bi-weekly Art Evenings and regular film screenings, a Progressive Muscle Relaxation and yoga course, a weekly running

club and PhD/Post-Doc Silent Study Sessions. The School offers targeted support for those with protected characteristics, ensuring that these colleagues are accessing research-support services the School offers as well as professional development opportunities. Staff are supported by a School mentoring scheme which is open to all and overseen by a mentoring lead. Mentors receive specific training and provide formal input into the probationary process. Peer mentoring (primarily aimed at 3–5 years post-probation) and coaching is also available, the latter being provided by the University's POD team. Staff can also discuss support and equality and diversity issues and other confidential issues as part of their PDR. For PGR students, we run a 'buddy' scheme, which means that every new student is allocated to a senior student at the beginning of their study.

Procedures to stimulate and facilitate exchanges between academia and business, industry or public or third sector bodies

As part of our recent drive to increase exchange with industry we have been hosting regular workshops on business engagement. We have surveyed staff to track new business activities and are working with the College Business Engagement team [REF5a 4.1] to support and to grow these relationships. Several of our staff are engaged in consultancy (see examples in section 4) and are involved in CASE awards. They are supported by the University Enterprise services [REF5a 4.1] who provide advice on market research for business development as well as running events including drop-in sessions and business breakfasts. The College Business Engagement team assists with relationship management, budgeting and contracts. With support from the Development and Alumni Relations Office and the Birmingham in Action campaign [REF5a 4.1], we have been working with HSBC UK as founding donor to support research into Youth Mental Health.

Recognition and support for staff delivering research and impact.

We recognise the demands of pursuing impact case studies and have procedures to ensure the case leads are supported. Institutional recognition of impact has been mirrored in our School PDR process, where we have encouraged colleagues to develop impact as a basis for individual success. Impact is celebrated through annual University Impact Awards (e.g. *Woodhams* and colleagues were awarded the College of Social Sciences' Outstanding Impact Prize 2019 and *Flowe* was shortlisted in the category of Outstanding Emerging Impact for the University Impact Awards). We have a dedicated School impact lead who supports staff via advice on embedding impact at the earliest stages of the research process. As part of this support, the School runs regular workshops on understanding and evidencing impact, working with policymakers, as well as development of resources for disseminating research to users. College pump-priming funds support the ongoing development of impactful projects and mentoring early career researchers in impact activities. The College Research Planning Partner also offers one-to-one coaching for researchers developing research impact [REF5a 4.1].

Research students

We have a vibrant and diverse PhD student group: 259 students graduated under the supervision of UoA staff (share of supervision 244 FTE) during the REF period.

Recruitment of doctoral research students

We attract the highest quality PhD students. Advertising is via diverse media including findaPhD, jobs.ac.uk, personal research networks/web sites. To encourage diversity in applications, we reviewed images/videos used on our web site to be as inclusive as possible. We have 12 videos of postgraduate students including 6 men and 6 women of which 6 are BAME students. The University supports recruitment via its International Office, with focused activity in China and India and supports high calibre students with a range of funded scholarships. Applicants are required to be interviewed by at least two members of staff.

Doctoral studentships

We are a key partner in 3 large-scale Midlands **doctoral training programmes** with Warwick, Leicester, and Nottingham Universities: an ESRC social sciences doctoral training centre, the BBSRC biosciences “MIBPT” programme, and the MRC’s biomedical “IMPACT” DTP. We are also a partner in the University-hosted EPSRC Physical Sciences of Imaging in the Biomedical Sciences CDT. The high quality of our applicants means we bid successfully for studentships. We have been successful in securing grant-linked studentships (e.g. ERC funded), grants from charities (e.g. Bailey Thomas Charitable Funds) and employers (e.g. HM Prison Service). We have been able to use University resources, as well as CASE schemes, to attract matching funding for 18 studentships from private and third-sector organisations and other Universities (e.g. University of Amsterdam and University of Paris Saclay).

Training needs and support mechanisms

All PhD students in the School complete a **Development Needs Analysis** at the start of each year to identify specific areas for development in relation to personal effectiveness, research methods, governance and ethics, impact, public engagement and Equality and Diversity. In the first year, they attend four courses and can choose from a variety provided by the University’s Graduate School and the School, such as advanced research methods, Matlab programming, thesis writing, teaching, open science, and viva preparation. We also run a workshop tailored to the needs of part-time students. All students prepare a data management plan. In subsequent years, courses are chosen based on needs. Most PhD students gain valuable teaching experience through paid Teaching Assistance work, which helps with employability. Support for international students is provided by the International Students Advisory Service (ISAS) and English for International Students Unit (EISU). The Doctoral Training Centres offer funded students the chance to complete a **Post Graduate Certificate in Advanced Research Methods and Skills** (PGARMS programme).

Progress monitoring.

PhD students’ progress is assessed regularly with their supervisors, recorded monthly on an online system. There is also an Annual Review form completed by the student and supervisor and signed off by the PGR Director. Formal stages in progress monitoring and feedback occur at 3 months (250-word summary), 9 months (5000 word report and *viva voce* examination with independent member of staff) and 24 months (review of a draft thesis chapter).

Career support

All PhD students have access to tailored careers events run by the Graduate School including PhD Job Club Tutorials and face to face advice on careers. We run psychology specific events e.g. with external speakers having neuroscience PhDs who have gone on to careers outside of academia.

Participation in the academic life of the School

The School Postgraduate Staff-Student Liaison Committee meets four times a year, is chaired by the elected PhD student rep, and reports to the School Committee. Research students feature prominently at our annual School Research Event, with all 1st year PhD and MRes students presenting posters, and all 2nd year PhD students giving talks, alongside presentations from staff. Research students participate in outreach activities, e.g. in Brain Awareness Week.

PGR Facilities.

All PhD students have their own desk and computer. Students on Doctoral training programmes have a yearly budget to fund research and training. The School funds all others with a small annual budget and ensures every PhD student can attend one major (international level) conference. Students are encouraged to acquire new research techniques and use the equipment available in the school. Students who use fMRI in their PhD can apply for free scanning time.

PGR Recognition

A key indicator of our quality research environment is that PGRs regularly publish their research in top tier journals as first author. A PhD/supervisor agreement is signed recognising the student's intellectual rights. PGRs have also been awarded an impressive number and range of prizes and awards over the REF period e.g. the 2017 University of Birmingham Three Minute Thesis competition; a finalist in the 2017 ESRC Writing Competition; the Linda Mealey Award from the International Society for Human Ethology; and the 2019 Cheryl Wynne Hare Award from the Society for the Scientific Study of Psychopathy.

3. Income, infrastructure and facilities**Research funding and strategies for generating income to support research/impact**

We secured over £28M funding from new research grants during the period 2014-2019/2020 from a wide range of funders including the European Commission, ESRC, EPSRC, MRC, BBSRC, Wellcome Trust, Leverhulme Foundation, as well as NIHR and the Department of Health (37% from research councils; 30% from EU government bodies; 18% UK charities). Excellent staff appointments, and processes to maximise the quality of grant applications (e.g. grant review and support from the College pre-award research team), have ensured this success in a challenging funding environment.

Our strategy of integrating excellent discovery and translation science in our research centres is aligned with trends in funding and enables us to increase the proportion of our research that is funded by large funding tranches. Complementing this, we are using the annual staff review process to incentivise and enable eligible faculty to apply for such funding. We are committed to providing a thriving research environment that enables staff and students to be active in research and impact. We recognise and value the diversity of research in the School and support research as a core part of what all members of academic staff do by providing support and resources to all.

Funding development is supported by a School-level review process, led by an experienced member of professorial staff. We encourage pitching of grant ideas at theme meetings, and more formally at the quarterly School Research Meeting. There is mandatory review of the main case for support within Research Themes, and of the full application by a senior colleague. The grant review process also includes the option for advice on unsuccessful applications. One recent example of this approach enabled an ECR to repurpose an unsuccessful bid to the Leverhulme Trust for an ESRC New Investigator application, which was successful.

Staff who sit/have sat on grant panels provide one-to-one support for early career researchers and colleagues who have not had recent funding (there is School representation for ESRC, MRC, EPSRC and Wellcome and from Lee who chairs the College BBSRC strategic advisory group). The College Research Support Office maintains a library of successful grant proposals, which are made available to applicants. A School-level fund pump primes research and impact activity. We prioritise applications that include new collaborations across research themes. Research groups also organise pre-submission review of papers to maximise the potential of research outputs as well as identifying opportunities to enhance the quality of underlying data through additional fieldwork. Staff receive a £500 allocation each year from School funds to support research and impact activity. We have also introduced an equalities Travel Grant for any member of staff to apply for funds to support travel for research/conference/training to cover additional costs related to personal characteristics – e.g. childcare, disability.

We supplement College and University workshops with our Quarterly School Research Meeting that has involved sessions on grant writing and achieving impact. The College Research Support Office (RSO) provides monthly updates on funding opportunities and directs staff to specific schemes. A college "grant support framework" facilitates the pre-planning of research support. Other support available at College level includes advising on call requirements, providing

feedback on applications, organisation of visits from UKRI representatives, preparation of mock funder interviews and post-award support.

Facilities and investment

The University has invested substantially in our infrastructure over the REF period including refurbishment of a new Psychology building containing offices and labs [REF5a 4.2.1]. A highlight has been the new adjacent CHBH imaging centre [REF5a 4.2.3] that houses a 3T Siemens scanner, a Neuromag TRUIX MEG system; functional near infrared (fNIRS), EEG, TMS and exercise laboratories.

Within the School we have 8100m² of space comprising a wide range of state-of-the-art laboratories and technical facilities to support research across the research themes. The University plans to invest a further £3M by 2022 to collocate the entire School of psychology in 3 adjacent buildings.

Other specialist facilities include a sleep laboratory housing a state-of-the-art EEG system; an Eye-Movement Lab; sound attenuating booths and speech recording equipment; haptic force feedback and motion tracking systems; force plates for measuring ground reaction forces; equipment to collect data using habituation or preferential looking methods in children; a suite of dedicated rooms supported by a kitchen for the assessment of eating behaviours; facilities for administration of drugs and blood taking and storage and physical examination of participants taking part in psychopharmacology studies.

Sustainability of facilities is supported by the policy of matching bids for substantial equipment from funding councils, coordination of bids to facilitate shared costs, and capacity to support research, including pump priming for research and equipment of around £40kp/a. The University technology platform provides access to high quality instruments and a charging policy to ensure replacement and updating [REF5a 4.4].

Collaborative use of infrastructure

To achieve the maximum benefit on research and impact in the School, many facilities are housed in research space that is either freely bookable, or under the control of a committee of users. In line with our strong culture of collaboration, sharing of space/equipment is commonplace.

We are users of the Wellcome Trust Clinical Research Facility at the University Hospital. Facilities include an outpatient area, inpatient beds, and consultation rooms for drug administration. We are also a user of the University of Birmingham facility for laboratory animals. We are users of the Birmingham Environment for Academic Research (BEAR) IT resource [REF5a 4.4].

We have a joint appointment between Birmingham and Nottingham (*Mullinger*), which facilitates collaborative use of equipment (e.g. of 7T fMRI scanner at Nottingham, MEG at Birmingham). For the future, we will be building on a recent bilateral agreement with University of Illinois Urbana Champaign (UIUC), that allows exchanges of MRI sequences. We are involved in local research networks in sleep (Co-chair: *Staresina*) and epilepsy (Chair: *Bagshaw*) which bring together scientists and clinicians on joint projects and collaborative use of equipment. We participate in the 'Midlands Innovation' equipment sharing initiative [REF5a 2.1.5] between the Universities of Birmingham, Nottingham, Leicester, Warwick, Aston, Cranfield, Keele and Loughborough. A searchable online database enables the ability to search through public equipment records from each MI University and includes descriptions and specifications of the equipment, location and contact details for more information and to make bookings and ensure efficient use of equipment. We are also part of the Midlands Medical Imaging Network (MMIN), which facilitates collaboration and access to equipment. MMIN has membership from all MI universities (Chair: *Bagshaw*).

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

Support for and effectiveness of research collaborations

Collaborations contribute to the high quality of our research and we encourage colleagues via the PDR process to explore collaborations and opportunities for internationalising their research. Small scale funding is available from the College for knowledge transfer activities and International activity e.g. staff can receive up to £1000 a year to support overseas travel aimed at enhancing international profile. The success of our collaborations is reflected in our many collaborative grants and papers. In the REF period 49.8% of published research articles in UOA4 involved an international collaboration.

Relationships with key research users, beneficiaries, audiences

Relationships with overseas HEIs/Research Networks

We are part of the **European University of Well-Being** [REF5a 2.1.8] which is a new alliance of seven top European universities with a mission to define how a modern, civic, and entrepreneurial university can support social and individual well-being in a global setting. We have strong links with the Orygen centre of excellence in **Melbourne University** [REF5a 2.1.8] facilitated by the joint appointment of *Wood* and the Priestley PhD Scholarships' programme jointly funded by Melbourne. The **UK-India collaboration** for school-based Mental Health prevention set up by *Mallikarjun* involves the NIMHANS (National Institute of Mental Health and Neurosciences, India) and Sangath (Third sector organisation, India). We have a strategic collaboration via our BRIDGE Fellow [REF5a 3.4.1] (*Chechlacz*) to the **Beckman Institute**, UIUC and staff have supervised PhD students funded by **Bilateral arrangements** with Brazil (*Lee* and *Bagshaw*) and France (*Higgs*). There are links to Nanjing China [REF5a 2.1.8] via a collaboration on the use of oscillations as a marker of pedagogical success (*Shapiro* with *Youdell* from the School of Education). *Apps* is a core member of the Hub for Research Into Intergenerational Vulnerability To Exploitation and National Joint Team Lead International Collaboration on the Social & Moral Psychology of COVID-19. Members of the School have also been awarded **visiting Fellowships** e.g. *Higgs* a Jean D'Alambert fellowship from University of Paris Saclay and *Shapiro*, Peter Wall Institute Visiting Scholar, University of British Columbia.

Relationships with NHS, Police and forensic services

We have close links with the NHS, particularly through **Birmingham Health Partners** [REF5a 2.1.3] (a strategic alliance between the University of Birmingham and two NHS Foundation Trusts – Birmingham Women's & Children's, and University Hospitals Birmingham), the **Birmingham and Solihull Mental Health NHS Foundation Trust** and **Forward Thinking Birmingham**. Forward Thinking Birmingham is the largest 0-25 age group mental health service in the UK and this connection provides a unique opportunity for research on early intervention. *Upthegrove* is the Birmingham Health Partners Pillar Lead for Health and Wellbeing and provides service input to operational policy for the Birmingham Women's and Children's NHS Trust Strategy on Early Intervention. There are links with the NHS in conducting single-unit firing invasively in epileptic patients undergoing pre-surgical evaluation (*Hanslmayr/Staresina* in collaboration with **University Hospital Birmingham**) and on language acquisition in children with language delays and to develop new interventions for these children (*Olson; Krott*). *Fernandez-Espejo* has collaborative projects with the **Wellington Hospital and local NHS Sites** (Moseley Hall, Leamington Spa Hospital) on the clinical effects of brain stimulation in patients with disorders of consciousness. The School is the hub for the **C-LINK academic-practitioner network** between researchers and police organisations in 11 countries, to collaborate on the development of advanced methods of crime linkage (*Woodhams*). We also host the police-funded Academic Advisory Group for Police and Government, providing opportunities for collaboration and the co-production of research to target serious offenders. These links enable the generation of students trained in these networks to develop the impact of their academic work and attract research commissions e.g. project commissioned by the Swiss Federal Police (to ECR *Davis* and *Woodhams*).

Relationships with education and third sector

There are strong research links to **local schools** (*Apperly, Beck and Devine*) and **charities** (e.g., Cerebra, Autistica, Stroke Association) through funded projects and board membership: *Oliver* is Co-Chair of the Professional and Clinical Advisory Committee for the Smith-Magenis Foundation; *Richards* is Scientific Committee Member for Research Autism and on the Research Advisory Committee for Cerebra. We are also working with The National Society for the Prevention of Cruelty to Children to help the charity in its response to children who are at risk of suicide (*Michail, Kloess*) and in developing guidance on safe use of online gaming (*Rogers*).

Relationships with business

One of our faculty (*DiLuca*) was on **secondment to Oculus/Facebook**, and we recently obtained our first substantial grant from this source (*Mazaheri & Shapiro* 124k). Our objectives are to develop this as an opportunity for two-way knowledge transfer, as well as aiding the development of collaborative and commissioned research. We have had several **BBSRC iCASE** studentships including two with the Experimental Medicine Company P1vital (supervised by *Higgs* and P1vital CEO *Dourish*). The School (*Wing*) has partnered with the University of Nottingham and Procter and Gamble on a BBSRC grant on active touch. Several members of staff have provided **consultancy** for business e.g. Consultancy for Crane Currency Ltd (USA), a global banknote design company (*Raymond*); Consultancy for Compass Pathways (*Higgs*). Research on children's food preferences has been funded by Danone Nutricia (*Higgs*) and *Higgs* is also a member of the Danone International Institute. Work on early diagnosis using eye tracking is funded by Actelion Pharmaceuticals (*Olson*). *Cruse* advised the World Bank on how to collect data on social development in school-aged children in Pakistan. *Upthegrove* has served on advisory boards with GSK, Autifony, and Janssen. *Bowman* is a consultant for Visionmetric and Spectamedical on using EEG for face recognition testing. *Woodcock* has a collaboration with industry partner Studio 14 in the development of graphics to support technology developed for the Open-Door project.

Wider contributions to the economy and society

Our expertise is highly sought after in the role of advisors for stakeholders and training. We organise workshops that enable practitioners, policymakers and patients to learn about our work and provide feedback that shapes further research. We prepare educational materials for charities, patients and the public at large. Examples beyond our impact case studies include: *Colloff* who conducted a knowledge exchange event with West Midlands Police officers on eyewitness memory; *Debrito* and *Kloess* provided academic consultancy for theatre-in-education company Round Midnight to develop educational virtual reality interventions to address risk taking in young people; *Kloess* works with the Loudmouth theatre-in-education company to examine the impact of a Child Sexual Exploitation intervention programme on children. *Rogers* was an academic Consultant for a documentary on Violence and Psychopathy (2019). *Bowman and Kloess* sit on an academic support group to West Midlands Police, Technological Intelligence Unit that is chaired by *Woodhams*. *Woodhams* also sits on the research ethics board for the Metropolitan Police. *Mevorach* provides training for teachers on attention training in autism as part of an impact acceleration project - ESRC-IAA and has partnered with the Rookery School in the Teacher Training and Attention in Autism Erasmus+ strategic partnership project. The Cerebra centre produces guides for parents of children with developmental disorders including "Sleep: A guide for parents" that has been disseminated alongside easy-to-read cards that have been commended by the British Medical Association. *Woodcock* presents regularly at conferences for family members of individuals with developmental disorders organised by support groups in Europe and North America.

Engagement with diverse communities and publics

The school actively encourages researchers to be involved in public engagement, across a **wide range of media and to undertake media training**. Our staff have featured on BBC radio and TV, ITV, Channel 4, (e.g. *Woodhams* featured in an ITN film and advises on story lines for TV

programmes; BBC World Service covered research by *Debrito* on conduct disorder in children; a press release for a paper on how right-or left-handedness affects sign language by *Thompson* was picked up by over 30 news sites).

Our work has featured prominently in international popular science journalism and we write pieces for sites such as **the Conversation** (e.g. article on weight stigma by PhD student *Meadows*, an article on the tip of the tongue phenomenon by *Segaert*, an article on rape in Kenya by *Flowe* and an article on brain patterns of consciousness by *Fernandez-Espejo* that got >85K reads in the first 3 weeks after publication). The established **Birmingham Heroes** [REF5a 4.1] campaign featured *Broome and Upthegrove* to promote research on youth mental health. *Flowe, Higgs and Woodhams* have written articles for the **Birmingham Brief** (short pieces on policy issues) and *Burnett-Heyes, Michail, and Reniers* have written pieces for the **Birmingham Perspective**. *Galea and Higgs* have contributed to the “water cooler neuroscience” podcast and *Broome and Upthegrove* write for the **Mental Elf blog**.

Our staff participate in and have organised **public science festivals**, including the British Science Festival, ESRC Festival of Social Science and Big Bang festivals, and Café Scientifique. One of our research staff initiated The Pint of Science Birmingham and this public event continues to be driven by our research fellows. In 2018, the Eating Behaviour research group held a sold-out event as part of the ESRC Festival of Social Science and the applied memory lab hosted an event on memory and the legal system. A meet the 'brain experts' event has run for the last few years as part of **Brain Awareness Week**.

We have established long-term commitments to public engagement by staff, and by new generations of researchers. The School organises regular events at **Thinktank** (Birmingham science museum), where staff and PhD students present displays and demonstrations on a research topic to a large public audience. For example, in 2018 the Centre for Applied Psychology ran an exhibit on eyewitness memory that won a **public engagement award**. Members also work closely with Thinktank to run studies with children and to advance the understanding of children’s learning about science through their interactions in the museum (e.g. collaborative PhD studentship with Thinktank supervised by *Beck*). We have also collaborated with the Barber Institute of Fine Arts [REF5a 4.3] on public events including a lecture on “Dividing Lines: A Brain Science view on Landscape” by Raymond and contributed a lecture on sleep as part of a University TEDx day (*Bagshaw*). Members of the IMH took part in “Where’s my story”, an event hosted by the **Shakespeare Institute at the Royal Shakespeare Company** [REF5a 2.1.7] in 2019 that explored the potential effects of representation in theatre on young people’s sense of identity.

The CHBH has an **Annual Public Engagement Prize** and a public engagement blog. We run tailored training in public engagement at School level and host “Public Engagement Hours”, which are monthly meetings open to all. We regularly accept sixth former Nuffield Research Placement bursary holders and provide lecture “masterclasses” for schoolchildren on campus (e.g. on Why We Eat What We Eat).

Contribution to the sustainability of the discipline /responses to national and international priorities and initiatives/ best practice in undertaking research that is reproducible

The School is a major national contributor to **professional training** in clinical and forensic psychology. Over 100 students graduate each year including doctoral-level graduates from the ClinPsyD and ForenPsyD, masters and diploma students and those pursuing continuing professional development. The courses in clinical psychology were highlighted as examples of good practice in a British Psychological Society (BPS) report in 2017.

Our research centres provide the critical mass and interdisciplinarity to enable us to respond to funding priorities and initiatives. **Exemplars of interdisciplinary research tackling global challenges** include: 1) The University of Birmingham Institute for Global Innovation [REF5a 2.3] Award for Challenge Theme of **21st Century Crime** employs a range of interdisciplinary

approaches to help understand how technologies present new challenges to both developed economies and Low- and Middle-Income Countries. The project (led by *Woodhams*) involves researchers from Economics, Law, Psychology and Nursing alongside partners including the National Crime Agency and the Wangu Kanja Foundation (WKF); 2) an interdisciplinary group led by *Upthegrove* comprises experts in psychosis, immuno-psychiatry, epidemiology, neuroscience, bioinformatics, genomics, and pharmacology and the company Celentyx Ltd, which focuses on the causes of **mental health** problems. The Psychosis and Immune Mechanism Stratified Medicine Study (PIMS) is investigating how immune dysfunction could cause psychosis and aims to develop new stratified medicine treatments for psychosis patients with active inflammation; 3) The optically pumped magnetometer (OPM) laboratory is a collaboration between the CHBH (*Jensen*) and the School of Physics and Astronomy (*Bongs*) as well as the Universities of Nottingham and Strathclyde and the Greater Birmingham and Solihull Local Enterprise Partnership to develop new sensors to be used for magnetoencephalography (MEG). The ambition of this project is to go beyond the limitations of current techniques for understanding **brain health** by developing a new technology that combines Transcranial Magnetic Stimulation with OPMs.

As mentioned in Section 1, we are leading on open science practices and this includes disseminating best practice on conducting research that is reproducible via our research workshops. UoA staff have published pre-registered, replication studies e.g. Meijer et al. (2019). *Cortex*, 119, 74-88 and Jones et al. (2019). *Nature Human Behaviour*. In addition, a group of our postgraduates is part of ReproducibiliTea, the international grassroots open science journal club. They prepared material on reproducibility, which is now used in our UG tutorial programme.

Contributions to and recognition by the research base

We are widely engaged in the peer review process for publication and funding. Such work is a critical contribution to the discipline, but also brings valuable expertise to the School.

Journal editorship

Higgs is **Editor in Chief** of *Appetite* and *Oliver* was Editor in Chief for *Journal of Intellectual Disability Research* from 2013-2018. Members of the school hold **action/executive/ editor** positions including for top tier journals such as: *British Journal of Psychiatry*; *Neuropsychologia*; *European Journal of Neuroscience*; *Cortex*; *Early Intervention in Psychiatry*, *Mind & Language*. Others hold positions as **Journal consulting editors** including for top tier journals such as: *Cognition*, *PLOS ONE*, *Attention*, *Perception*, & *Psychophysics*, *Journal of Experimental Psychology*, *Journal Child Development* and *Wellcome Translational Development Frontiers in Psychiatry*, *eNeuro*, *Scientific Reports*, *PLoS Biology*, *eLife*, *Clinical Neurophysiology*. Naturally, all members of staff are involved in *ad hoc* peer review for journals across the entire range of our activity.

Membership of grant committees

Members of the school have chaired grant panels (*Oliver*: Chair of Autistica Scientific Advisory Committee and Cornelia de Lange Syndrome World Scientific and Clinical Advisory Committee), sat on **grant panels** (BBSRC, *Lee*; *Shapiro*); EPSRC (*Schofield*), ESRC (*Apperly*; *Beck*); MRC (*Miall*; *Galea*); Wellcome (*Miall*; *Bagshaw*, *Galea*, *Wilding*), ERC Marie Curie Fellowship Panel (*Galea*; *Wimber*) and have contributed to **peer review colleges** (for BBSRC; Epilepsy Research, UK; ESRC; ESRC Doctoral Training Peer Review College; EPSRC; MRC; Wellcome Trust; Royal Society Newton Fellowship Committee) and the BBSRC People and Talent Strategy Advisory Panel (*Wilding*) Wellcome Strategic Funding Panel (*Broome*); NIHR Research for Patient Benefit Panel (*Marwaha*).

In addition to *ad hoc* reviews for national funding bodies, members of the school contribute to **international grant review**, including German Research Foundation (DFG); Australian Research Council; FNRS (Belgium); NIH and National Science Foundation (USA); NSERC and Canadian Institute for Health Research (Canada); Netherlands organisation for Health Research and Development; ANR, France, European Research Council; Italian Ministry for Education.

Invited keynotes

Recognition of our profile and influence is reflected in staff giving invited keynote or plenary presentations at International events including: Eurosense (*Higgs*), 39th Minnesota Symposium on Child Psychology: 2015 (*Apperly*), 2nd International Conference on Sign Language Acquisition Amsterdam (*Thompson*), Royal Society Workshop, South Africa (*Debrito*), Conference on Executive Function in Childhood, Germany 2016 (*Devine*), International Conference on Educational Neuroscience, Abu Dhabi 2019 (*Cook*), British Association for Cognitive Neuroscience, 2018 (*Galea*), International Update Neuro-Anaesthesia and Neuro-Intensive Care Meeting, Spain, 2016 (*Fernandez-Espejo*), Currency Conference, Kuala Lumpur, 2017 (*Raymond*) The Czech Academy of Sciences, Prague, 2017 (*Bagshaw*) Foundation for Prader-Willi Research US, 2018 (*Woodcock*), Space-Time Geometries and Movement in the Brain and Arts, Paris, 2018 (*Miall*), and the Australian Society for Autism Research Annual Conference 2018 (*Oliver*), Society for Social Neuroscience Annual Conference (*Apps*).

Prizes

The research and impact of several senior and junior members of staff have been recognised by the award of prestigious prizes e.g. *Jensen* and *Hanslmayr* received Royal Society Wolfson Research Merit Awards, and *Jensen* a Wellcome Trust Investigator Award in Science. *Woodhams* was Awarded A Real Impact Award 2019 for research with Real World Positive Change. In 2018 the Mid-career award of the British Association for Cognitive Neuroscience went to *Miall*, and the Early-career award to *Galea*. *Wood* received the Society for Mental Health Research Oration award in 2017. *Upthegrove* and *Broome* are elected Fellows of the Royal College of Psychiatrists. *Higgs* was awarded the Hoebel research prize from the Society for the Study of Ingestive Behavior. *Hickey* and *Lockwood* were awarded the APS Rising Star Award in 2015 and 2019 respectively. The 2016 Young Investigator Award from the International Conference on Biomagnetism was awarded to *Park*. *Apps* was the recipient of the of the Society for Social Neuroscience Early Career Award in 2018 and the British Association for Cognitive Neuroscience Early Career Award in 2020. The 2016 Junior Award in Forensic Psychology went to *Kloess* and she received the Early Career Researcher Prize from the British Psychological Society. *Woodcock* was recognised for outstanding contributions to research into Prader-Willi syndrome. Both *Cook* and *Colloff* were awarded prizes for outstanding doctoral work (the Frith Prize and International Thesis Award from the American-Psychology Law Society respectively)

Service to learned societies.

We are highly involved in external academic service, illustrated by the following select examples: President of the Society for the Study of Ingestive Behavior (*Higgs*); Board member, Neural Control of Movement Society (*Miall* 2014-16; *Galea* 2019-22); Chair, International Association for Attention & Performance (*Raymond*); Secretary, Autism Spectrum Disorder Special Interest Group, International Association for the Scientific Study of Intellectual Disability (*Richards*); BPS Memory Evidence committee (*Flowe*). Treasurer of the European Society for Philosophy and Psychology 2011-16 (*Apperly*); International Officer for the Sign Language Linguistics Society (*Thompson*); Elected Council Member British Association for Psychopharmacology (*Upthegrove*); Board member and vice president IEPA Early Intervention in Mental Health 2014-18 (*Wood*) and executive committee member of the International Association for Youth Mental Health (*Broome*). *Marwaha* is Co-Chair of the International Society for Bipolar Disorder Task Force on Early Intervention in Bipolar Disorder and *Lockwood* is elected board member for the Society for Neuroeconomics.

Conference and workshop organisation

We are host for the Biomag conference 2021 (postponed from 2020 due to the Covid-19 pandemic), which is the foremost international conference for researchers working on biomagnetism. The School hosts Annual "ERP bootcamps" in advanced ERP/EEG recording. *Bagshaw* was host organiser for the Multimodal Connectivity Workshop in 2015. The first Single Units and Human iEEG (SUsHi) Meeting was due to take place in 2020 but had to be cancelled due to the pandemic. Other staff have served on organising committees e.g. for the 20th annual meeting of the Association for the Scientific Study of Consciousness, Argentina (*Cruse*), for Biological Psychiatry Australia, 2019 (*Wood*) and for the Society for the Study of

Behavioural Phenotypes, 2019 (*Woodcock*), Society for the Scientific Study of Psychopathy 2021 conference - Programme Co-Chair (*Debrito*), Programme committee member for the 2017 conference of the Cognitive Science Society (*Apperly*) and Co-organiser Society for the Biology of Decision Making, Oxford, 2019 (*Lockwood*).

Summary

We have capitalised on significant institutional support to create an inclusive research environment that is supporting the delivery of world-leading research with impact by nurturing talent and facilitating collaborative, interdisciplinary ways of working. We have attracted and retained outstanding researchers from early career to professorial levels, many of whom have been honoured for their achievements and leadership in their field and who are strongly influencing disciplinary developments. We are proud of our extensive contributions to the research base, economy, and society. Our strategy and vision will ensure that we will continue to be at the forefront of innovative, interdisciplinary, and translational research that will address global challenges.