

Institution: University of Hertfordshire
Unit of Assessment: 4 Psychology, Psychiatry and Neuroscience
<p>1. Unit context and structure, research and impact strategy</p> <p>This Unit comprises 18.9 FTE (21 staff) which is a 55% increase over REF 2014. The Unit comprises 6.6 FTE Professors, 2.3 FTE Readers/Principal Lecturers, 7.0 FTE Senior Lecturers (one of whom is an early career researcher: ECR), 1.0 FTE Lecturer, 2.0 Research Fellows, (one ECR). Staff are exclusively drawn from the Department of Psychology and Sport Sciences, one of three Departments in the School of Life and Medical Sciences (LMS).</p> <p>In 2015 LMS undertook a strategic review that established the University-approved Centre for Research in Psychology and Sport Sciences (CRIPSS). The Centre's mission is to consolidate and develop Psychology research, and to develop research in Sport Sciences. Over the REF period, the Head of the Research Centre has since been appointed Associate Dean Research (ADR) for LMS (Page) who worked with Troop (Postgraduate Tutor), Nel (DClinPsy Director), and Bottoms (Deputy Head; a sports scientist).</p> <p>Notable achievements and successes in this REF period are:</p> <ul style="list-style-type: none"> • 87% overall satisfaction in the 2019 Postgraduate Research Experience Survey (PRES) with 87% for Supervision, 83% for Research Skills and 88% for Progression and Assessment. • 134 doctoral awards in the period equating to more than one award per FTE per annum. • 47% uplift in commissioned places on the Doctorate in Clinical Psychology (DClinPsy) by NHS Health Education England. • 23% increase in the mean annual research income in comparison with REF 2014. • Unit staff member (Wiseman) was featured on the popular BBC Radio 4 programme <i>The Life Scientific</i> in October 2019. <p>Strategy</p> <p>The Unit's first two strategic aims from REF 2014 are immediately following with a further two being addressed under the headings Interdisciplinary Strategy and Impact Strategy</p> <p>Thematic continuity and strategic appointments: there were five research groups in REF 2014: <i>Cognitive Neuropsychology</i>; <i>Health and Clinical Psychology</i>; <i>Learning, Memory and Thinking</i>; <i>Movement</i>; and <i>Behaviour Change in Health and Business</i>. These groups remain core to the Unit's activity, but recent, strategic appointments in forensic psychology have been made, and research in this area has grown sufficiently that <i>Forensic</i> has been identified as a sixth group.</p> <p>Strategic appointments have been made to ensure the continuity of research in key areas following the retirement of staff (Fletcher, Pine, Lovatt). For example, to refresh and strengthen the <i>Behaviour Change</i> group, QR-funds were used to support Howlett's PhD work, carried out part-time while he was a member of staff, and bolster his growing independent research programme. Furthermore in 2019, Brown was appointed as Professor of Behaviour Change in Health immediately followed by a complementary Associate Professor appointment (Newby). Both Brown and Newby (who is returned in UOA3) have extensive collaboration with public health bodies. This strategy was vindicated by Brown having secured, as PI, £1.2M in the first round (2020) of NIHR funding for Public Health Intervention Responsive Studies Teams (PHIRST), to evaluate local-authority public-health initiatives and to reduce health inequalities in a collaboration with the Universities of Ulster, Birmingham and East Anglia.</p> <p>The Unit has also responded to new opportunities. The appointments of Adler and McSweeney as, respectively, Professor and Senior Lecturer in Forensic Psychology, provided the opportunity</p>

to develop a new *Forensic* research group. Their research was integrated with relevant strands from the *Memory* and the *Movement* research groups (Akhtar, Georgiou, Gurney), to establish a new research grouping that has already attracted external funding awards (£497k in 2019-20).

Targeted ECR support, to seed external funding: A consistent strategic priority for CRiPSS has been to develop research lines and to use targeted ECR support to improve prospects for significant, national-level competitive funding. Consistent with the Unit's REF 2014 *Future Plans*, a Research Fellow was employed (Rose) to develop interdisciplinary research in Dance and Parkinson's. This work has involved close coordination with local/regional Parkinson's groups and successfully obtained external funding to support a new Knowledge Exchange Embed Partnership (KEEP+, £67k). Another Research Fellow (Mair) was engaged in a project exploring wearable memory aids for people with mild cognitive impairment, another research-line identified in REF 2014. This project won further competitive support with a British Academy-Leverhulme small grant (£9k) and a British Academy Research Fellowship (£324k). Unit QR funding was also used to support a part-time Research Fellowship, joint-funded by the Hertfordshire Partnership Foundation NHS Trust (HPFT), with the specific strategic aim of enhancing research collaboration. This successfully seeded the *Making Positive Moves* grant (£248k) from the NIHR Research for Patient Benefit fund, involving the Doctorate in Clinical Psychology (DClinPsy) team, HPFT, the South London & Maudsley NHS Trust, the University of Warwick, and Hertfordshire County Council. In each of these cases strategic QR investment seeded a successful bid for significant, national-level competitive funding.

Throughout the REF period, six rolling QR-funded PhD studentships have been supported, deployed strategically across groups, under the direction of the Head of Research Centre. In the *Cognitive Neuropsychology* group, the work of Laws, Done, Jenkinson and Knight has been taken forward with five PhD studentships, which have contributed to their ongoing collaborations with UCL and KCL among others (see Section 4). Three PhD studentships supported the Unit's Dance for Parkinson's research, and three more worked in the *Learning, Memory and Thinking* group (two with Kvavilashvili on prospective memory, and one with Page on serial memory). Two funded PhD studentships have supported Troop's research, which helped him establish the *Psycho-haematology Research Unit* with a postdoctoral fellow and with DClinPsy staff, to further develop their research in psychological aspects of chronic illnesses.

Interdisciplinary Strategy

Many of the structures in place at the University, and with the Unit's local research partners, are specifically designed to encourage interdisciplinary research. In 2016 the University established six interdisciplinary Research Themes: Food; Global Economy; Health and Wellbeing; Heritage, Culture and Communities; Information and Security; Space. Research Themes promote interdisciplinary collaborations and facilitate external funding applications. Much of the Unit's research falls within the Health and Wellbeing Theme, and there are active collaborations with other groups, such as in the Centre for Health Services and Clinical Research, and in the School of Health and Social Work. For example, the large grant awarded to the East of England Research Design Service (RDS, £818k, 2013-18), which was initiated by Done and that formed part of the REF 2014 *Future Plans*, continues, having been renewed for a third five-year period (£605k 2018-23). Brown's £1.2M PHIRST grant together with Newby and Brown's £460k NIHR grant, are further examples of the within-theme collaboration across Centres/Schools.

A joint Psychology and Sport Sciences Research Centre affords opportunities for interdisciplinary collaboration. Howlett's research, with Troop, University of Bedfordshire, Hertfordshire County Council, and the Hertfordshire Sports Partnership (including the Centre's sports science researchers), has produced successful translational research. This group's systematic review and theoretical analysis, using the COM-B framework, of the effectiveness of prior behaviour-change interventions, led directly to the design of new interventions as part of the *Active Herts* programme, a community physical-activity programme for inactive adults with cardiovascular risk factors and/or mental-health issues (see Section 4). The £2.28M READY grant from NIHR, considering physical-activity interventions in adolescents at risk of mental-

health issues, is likewise, an interdisciplinary collaboration between psychologists (Howlett, Sharma) and a range of other health researchers from the University's two health schools.

Finally, the strategic support for a postdoctoral fellow, joint-funded by HPFT outlined above, to catalyse specifically interdisciplinary funded projects with local NHS Trusts, has already seeded grant funding (*Making Positive Moves*) with several partners.

Impact Strategy

Interdisciplinary research also results from the Unit's focus on maximising research impact. Key features of the Unit's impact strategy are:

- **Regular impact auditing of all the Unit's research:** in collaboration with the University Research Office, the Centre has conducted regular, formal impact audits, and has used these audits to direct resource towards promising areas.
- **Specific, focussed workload-allocation for the development of impact, supported by QR funds:** Selected staff (Fletcher, Pine, Lovatt, Wiseman, Howlett) have been allocated ring-fenced time (0.2 FTE each) for impact/outreach activities. This support has been directed towards research lines with clear impact potential (respectively, the behaviour change programme *Do Something Different*, Dance for Parkinson's, public engagement in Psychology, *Active Herts*). The *Do Something Different* Impact Case Study stems directly both from specific support given to staff to develop this work as designated Impact Associates, and from more general strategic support given to *Behaviour Change*, as a group with high impact-potential. This commitment is also evident in the recent Professorial appointments noted earlier. The joint appointment with HPFT also attests to the Unit's strategic approach to impact: translational research with the NHS has underpinned the Unit's other Impact Case Study on Obsessive-Compulsive Disorders from the Cognitive Neuropsychology group (Fineberg/Laws).
- **Support for impact across the range of research activities:** while focussed funding has been provided to Impact Case Studies from both the Unit and the University, impact development has also been funded more broadly. For example, in 2019 a *Fifty-for-Fifty* funding scheme was introduced to celebrate the 50th anniversary of Psychology at the University. £50k of QR funding was made available for open bids from Departmental Staff. The brief was that projects should focus on one or both of two themes: "Extending what we know"; and "Living what we know". The first responded to a desire to perform informative research; the second to a desire to ensure that research was impactful. Staff were encouraged to seek out collaborative partners, with a specific emphasis on community partners. Ten grants were awarded, supporting projects in each of the Unit's core research areas (see Section 4).

Impact is considered as being integral, rather than "in addition", to both the overall research strategy and the interdisciplinary research strategy. For example, Ludlow and Gutierrez have built on their underpinning research into autism and other neurodevelopmental disorders (supported by Ludlow's £128k grant from charity *Action Medical Research for Children*) and have enhanced its impact through the establishment of the Psychopathology and Neurodevelopmental Disorders Applied (PANDA) Research unit. This initiative brings together academic psychologists, students and volunteers to conduct research into emotional, cognitive and behavioural differences in children/adults with mental-health issues and/or neurodevelopmental disorders. *PANDA* directly supports students on the MSc Research in Clinical Psychology by offering placements and research opportunities.

Complementary research concerning developmental disorders includes Ryder's research on language disorders and autism spectrum conditions (ASC), and interdisciplinary research with University computer scientists, through an NIHR grant (£138k) supporting the KASPAR Project (robot communication with children with autism). A recent QR-funded PhD student researches cognitive aspect of ASC through her project drawing on these excellent links with local ASC groups. *PANDA* also has strong links with numerous support groups and schools, as part of a service to the community, and has close relationships with NHS Trusts, child mental-health

teams (ADD-VANCE, CAMHS, and CHUMS), charities (Tourette's Action; National Autistic Society), and specialist schools. Its web presence provides regular research updates, including lay summaries of recent findings, and useful advice for parents, carers and professionals. For all these reasons *PANDA* exemplifies the Unit's impact strategy; it demonstrates how its fundamental research, supported by investment in ECRs, contributes to multidisciplinary collaborations with a variety of research partners, and thereby engages impactfully with the wider community.

Open Research Environment and Integrity

The University has recognised the Budapest Open Access Initiative (BOAI) definition of Open Access. The Unit is committed to the immediate, unrestricted, online public availability of peer-reviewed research outputs free of charge, to enhance intellectual inquiry, support new research, enrich education and maximise the impact and value of its research for wider economic and social good. Where strategically important, the Unit has used the University's central funds to enable Gold OA publication. Beyond this, staff have been required to strictly comply with REF requirements in relation to Green OA.

The Unit has, however, gone beyond the basic requirements of OA and has responded constructively to wider issues concerning Open Research (OR) and the "replicability crisis". All job adverts invite candidates to evidence demonstrable commitment to OR, and, in recruiting a Senior Lecturer in research methods, it was ensured that the appointee (Akhtar) was made responsible for the co-development (with staff) of the Centre's OR policy. In addition to OA publication, this policy deals with all aspects of OR, from preregistration of research (including through the Open Science Framework), registered reports, the archiving and open availability of research data (in line with the Concordat on Open Research Data) and the analyses applied to them. Unit staff have, through their research and their public roles (e.g. Laws as editor of *BMC Psychology*), demonstrated their commitment to OR, and Page has represented the Centre on the UK Reproducibility Network and at Open Research Working Group meetings. To avoid OR practices becoming themselves an elite preserve, training opportunities have been made available to staff at all levels. Leading researchers in the OR community (e.g. Lakens, Munafo) have been invited to address staff at regular research seminars, and high-quality training on new techniques and methodologies designed to improve the replicability of the Unit's research (e.g. by Dr Mark Andrews) has been delivered to staff/students. OR policy development is the subject of regular discussion – in Autumn 2019 an entire term of the Unit's fortnightly research seminars was dedicated to it. New models are actively adopted. For example, in 2019-20, eight lifetime subscriptions to the innovative publication platform PeerJ were purchased, enabling staff to publish Gold OA, without cost, in perpetuity.

The commitment to Open Research is key to the Unit's culture of research integrity. Full transparency of the processes and data underpinning research helps to ensure that research integrity is more than just an aspiration. This extends to the training provided to the Unit's PhD students: use of a proactive policy whereby external examiners are asked to prioritise evidence of OR practices and other indicators of research quality, over simply the number of experiments or specific results.

The University is a signatory to the Concordat to Support Research Integrity and there is centrally provided, mandatory training on research integrity for all researchers, including workshops, an annual seminar and the inclusion of modules in the Doctoral College's Researcher Development Programme.

Future Strategy

The Unit's future research strategy is closely aligned with the University Strategic Plan for Research 2020-25. Key aspects are:

1. **Supporting staff and students to carry out research with openness and integrity.** The Unit will:

- a. Continue to deploy QR creatively, through the Unit's research delivery plan, to seed successful external funding bids.
 - b. Strongly promote Open Research through appropriate engagement and training opportunities.
 - c. Continue to improve on the high-level of satisfaction in the Unit's research environment, as exemplified in the 2019 PRES (see Research Students, Section 2), through a well-developed PRES Action Plan.
2. **Responding positively to national and global challenges** employing, where appropriate, an interdisciplinary team. The Unit will:
- a. Further develop its research on behaviour change in health.
 - b. Establish a collaborative interdisciplinary approach focussed on health inequalities.
 - c. Build on its established research into healthy ageing, including research on wearable memory aids for people with MCI/AD, together with a wider focus on cyberpsychology, an interdisciplinary research area of anticipated future growth.
 - d. Further develop the Forensic research group, especially through contract research in applied settings where an interdisciplinary approach may be necessary.
3. **Engaging communities with impactful research.** The Unit will:
- a. Ensure both continuity and further diversification of the *Movement* group to encompass, for example, fine-grained movement analysis to tailored interventions for people with autism and other developmental disorders. This will include wider use of a recently acquired motion-capture system to enhance the impact potential of the *PANDA* unit, and to extend gesture research that can be applied in developmental and forensic settings.
 - b. Continue to apply research in local communities, e.g. by expanding the *PANDA* unit, *Active Herts* and research with charities.
4. **Nurturing and growing research partnerships.** The Unit will:
- a. Continue to support translational research, further enhancing its impact.
 - b. Actively work with local NHS Trusts, including through the joint-funded post with HPFT.
 - c. Increase recruitment to the very successful DClinPsy programme in response to growing demand from commissioners.
 - d. Engage further with academic partners worldwide (see Section 4), providing support for study visits, joint funding applications, dual award PhDs and international conferences.

2. People

Staffing Strategy and Staff Development

The Unit's staffing strategy since 2014 has been to strengthen areas of expertise within the five research groups together with the establishment and development of a sixth Forensic group through investment in key new appointments, and also to enhance the research culture by providing an environment where both staff and research students can thrive.

All staff with significant responsibility for research (SRR) are allocated at least a 20% research time allocation as part of a comprehensive departmental workload model, and allocations are set against targets for outputs, grant applications and PhD supervision, where appropriate. Research support for staff is enhanced by a mentoring scheme for ECRs, who also form an ECR group, with lunchtime meetings hosted by the Deputy Head of CRiPSS, who has special responsibility for ECR development. The ECR group, established in 2011, has a broad remit, offering training in specific topics (e.g., funding opportunities, R statistics, bid writing). It also provides a forum for peer review of papers/grants. ECRs have benefitted from a variety of targeted internal grant schemes – for the development of impact, for additional training, and for funding small projects – all of which have been supported at both Unit and University level.

All staff have access to development and promotion opportunities, in line with a commitment to the Concordat to Support the Career Development of Researchers (2019). There are annual

rounds for academic promotion to Reader, Associate Professor, and Professor. Development activities include those organized at the whole-University level, as well as more specific, focussed opportunities offered within the Unit. Staff are encouraged to access the academic-development programmes, provided centrally by the HR Development Group, as well as the Doctoral College's Researcher Development Programme which provides a comprehensive programme of over 50 short courses annually, addressing the research needs of staff and research students. As an example of intra-Unit developmental activities, the Head of CRiPSS commissioned a monthly series of workshops enabling staff to refresh and extend their statistics skills, with a focus on reproducible methods and Open Research. Researchers are actively encouraged to employ modern statistical methods (e.g. by preferring approaches based on estimation, equivalence testing, model comparison, and/or Bayesian analysis, in place of default null-hypothesis testing) and to use pre-registration/registered reports to address concerns regarding replicability.

All staff have an annual appraisal, with a six-month follow-up. Most staff with SRR are appraised by the Head of CRiPSS and workload is assessed using a model agreed by staff, with realistic research objectives identified. The Unit spends around £30k per year on People Development; funds are supplemented by QR for more expensive research trips. Where strategically justified, funds have been deployed for research sabbaticals. For example, Jenkinson's research allocation was increased to 0.5 FTE for a year to facilitate a research collaboration/training in Italy. The Unit has targeted academic exchanges to develop research: it hosted Professor Niedzwienska (Krakow) on a Marie Curie Inter-European Fellowship (2014-6). International exchange visits have been strategically funded. Rose was funded by QR to make extended research visits to Canada (with Grahn) and to Lille (with Delevoye-Turrell). Page has maintained his collaboration with Belgian colleagues (Duyck at Gent; Szmalec at Louvain-la-Neuve) through joint PhD supervision, and one of the resulting Belgian Research Fellows (Smalle, at Gent) is now co-supervising a PhD student in the Centre, facilitating mutually supportive academic exchange.

The Unit delivers a well-regarded seminar series that welcomes internationally renowned speakers. In this REF cycle, it instituted a parallel series of more informal internal research seminars for staff and research students for them to discuss work-in-progress. These seminars also make staff aware of upcoming funding opportunities and improve the quality of applications through peer support. Together with recent infrastructure investments, these activities have substantially enhanced the vibrancy of the Unit's research culture as attested by the 2019 PRES results noted in the next section.

Research Students

The University obtained extremely positive results in the 2019 PRES with feedback from 62% of research students (average participation nationally was 42%). It was ranked 21st/103 universities for overall satisfaction, was 4th/103 for research culture and 15th/103 for supervision. At the local level, Psychology scored very highly for Supervision at 87%, Research Skills at 83%, Progress and Assessment at 88% and with 87% satisfaction with the overall experience.

On the REF census date, the Unit had 85 Doctoral-level students (74.8 FTE) comprising 31 PhD students (20.8 FTE) and 54 full-time DClinPsy students. Some 72% of doctoral students are women with Black, Asian, or Minority Ethnic students comprising 32% of the cohort overall. Over 90% of these doctoral students are funded from external sources. All research students are provided with a team comprising a minimum of two supervisors approved by the Doctoral College which must have undertaken two successful doctoral supervisions. The Doctoral College provides an online Research Student Management System to support both students and supervisors on which supervision meeting, progress reports and assessments are recorded to ensure a secure and robust process. Doctoral-level annual awards over the REF period are shown in Table 1.

Table1: Doctoral awards 2013-14 to 2018-20

Year	2013-4	2014-5	2015-6	2016-7	2017-8	2018-9	2019-20	Total
Doctoral awards	17	18	22	22	21	15	19	134

Opportunities for research progression are built into the design of the research degree programmes. The MSc Clinical Psychology is designed to enable a student to progress onto the DClinPsy programme. Admission to the DClinPsy is highly competitive, with several hundred applications for the (hitherto) 15 commissioned places annually. Some fee-paying students are also accepted each year. In May 2020, NHS Health Education England increased by 25% the number of DClinPsy training places commissioned nationally, while Unit commissioned places were increased by 47% (to 22 places), reflective of high esteem placed on the programme. Furthermore, in March 2021 the Unit commission was increased to 52 students per year, an additional increase of 136%. This esteem is corroborated by the BPS Alternative Handbook, where 83% of students were “likely” or “very likely” to recommend the programme to prospective students. DClinPsy graduation success is currently 98%, and almost all graduates take up NHS posts.

In addition to the extensive researcher development programme provided by the University Doctoral College outlined in Staffing Strategy, the Unit has provided in-house research training for research students, principally through the modularised MSc Research Methods in Psychology, but also via internally run training sessions. Doctoral students are encouraged to attend weekly seminars and must present their work in at least one such seminar. They are also provided with funding to present at one international conference. The effectiveness of these combined arrangements is evidenced by the 2019 PRES student responses.

Equality, Diversity and Inclusion (EDI)

Unit staff have had key roles in the successful achievement of the School’s Athena Swan Bronze Award obtained in 2016 and in the preparation for the Silver Award planned for submission in November 2021. They are also members of the School’s Athena Swan Equality Diversity and Inclusion Team (EDIT). Specific EDI actions have included: ensuring that Athena Swan principles are embedded in Research Centre strategic plans; delivering a series of training/support events, including the Aurora Leadership programme (supplemented by the University’s own Leadership Potential scheme); workshops on Trans Awareness, and Menopause; providing information to staff on topics such as nursery and parental leave, flexible working, and Keep in Touch days; enforcing a School-wide policy discouraging out-of-hours emails; ensuring that timing of research and other events is consistent with family commitments; developing a new School-level network for women in research (Conversations and Connections: CoCo); and using the annual School research conference specifically to promote more women keynote speakers, as well as ensuring an appropriate gender balance in conference speakers overall.

All Unit staff have undergone equality training, including at department away-days, and new staff have mandatory training in their induction. They have all attended training on Unconscious Bias, and the University delivers regular awareness-raising events, like the annual Black History Month. The University is one of only 17 institutions to have been awarded the Bronze award for the Race Equality Charter Mark. All recruitment advertising explicitly encourages applications from under-represented groups including, in the case of postgraduate research students, those who are first in family to attend University.

The Head of the Research Centre regularly audits the distribution of QR funds, following the research delivery plans, from an equality perspective. In the latest audit, around 55% of QR

funds were distributed to women academics. All three of the most recent full-time Research Fellow appointments were women ECRs, and over half of QR-supported PhD students are women. There is a nearly equal gender split (8.6 FTE women, 46% of submission) for staff in the Unit which is a small increase over the 43% women in the REF 2014 submission. Of the 6.6 FTE currently submitted staff who are at professorial level, 3.0 FTE (45%) are women. 3.0 FTE (16%) Unit staff identify as BAME, compared to 4% in REF 2014.

ECR group support and the Unit mentoring scheme both assist with career planning for ECRs, together with oversight from the CRiPSS Deputy Director, with specific responsibility for ECR development. All staff in the Unit have permanent posts, except for one 5-year Vice-Chancellor Research Fellow appointment where the intention is of progression to a permanent academic post. The University also promotes 'family friendly' policies such as flexible working, has an on-site nursery, and offers support for staff with caring responsibilities.

3. Income, infrastructure and facilities

Income

Table 2 shows the research awards and income for the Unit over the REF period. The mean annual research income represents an increase of 23% over the REF 2014 period.

Table2: Research awards and income 2014-2020 £k

Year	2014	2015	2016	2017	2018	2019	2020	Mean Annual
Awards	753	257	388	252	243	1291	1881	770
Income	580	694	686	551	563	347	462	555

The cross-year profile in Table 2 mirrors developments in the structure of the Unit's research. In 2015 the School established new Centres and some psychology projects were attributed to UOA3 through the Centre for Clinical and Health Services Research. For this reason Table 2 shows a decline in awards in 2017 and 2018. Following the establishment of CRiPSS, with the implementation of the strategic plan described in Section 1, a sharp growth in award success has been achieved in 2019 and 2020. Notable among these awards are: Brown's NIHR £1.2M PHIRST grant ; Brown's £461k WRAPPED Project, an NIHR-funded randomised, controlled feasibility trial of an interactive digital behaviour change intervention, designed to decrease incidence of sexually transmitted infections; Adler and McSweeney's £407k and £91k grants for the Youth Endowment Fund Charitable Trust, and for the Office for Security and Counter Terrorism, respectively; the £248k Making Positive Moves grant for the NIHR Research for Patient Benefit strand. Hence the mean annual award value now substantially exceeds the mean annual income, which is a strong signal of continued future income growth.

Infrastructure and Facilities

The University is part-way through a £250M investment programme in its College Lane campus that, over the next five years, will see the Unit located in a new building. Pending this development, £386k was spent in 2018 on refurbishment and enhancement of the Unit facilities with a specific focus on the research laboratories. Over the last five years new research equipment has included: an Eyelink 1000 Plus eye-tracker (£31k), capable of sampling eye-movements at 2000Hz; a multiscreen curved-display set-up and advanced head-mounted display (£8k), supporting Knight's work on spatial navigation in virtual environments; a 32-channel EEG system (£27k), housed in a bespoke Faraday-shielded booth (£31k) for enhanced measurement accuracy; and a 12-camera 300fps, Vicon motion-capture system (£36k), to be

used by the *Movement* group, such as in Whyatt's research into micro-motion deficits in developmental disorders.

The Unit maintains a number of high-quality systems for data capture and analysis, including: the Observer XT system for coding video; a Biopac system for physiological measurement (in which a further £10k was recently invested); an audio booth for recording high-quality experimental materials; and production-quality video equipment with a full AV editing and control suite linked to a dedicated observation lab with one-way-glass viewing facility. The Unit also operates an automated system, SONA, for booking experimental participants, and research activity is supported by three dedicated, onsite psychology technicians. For online experimental work, Gorilla Experiment Builder is used, with recruitment through Prolific Academic. In response to the COVID-19 pandemic, the resources applied to this online testing were significantly expanded (with over £20k utilised), to maintain all experimental research.

For neuroscientific data collection other than EEG, staff have access to a 3T MRI scanner through the Unit's collaboration with the Paul Strickland Scanner Centre, Middlesex. In addition, research funds are reserved each year for responsive mode, small-equipment purchases, and the University runs an annual capital funding round through which much of the above equipment has been procured. Following the recent facilities enhancement both physical infrastructure and equipment satisfactorily meet the research requirements of Unit staff.

In addition to equipment and the physical infrastructure there has been a focus on organisational infrastructure to support research and impact. A strategic investment in 2019 in a new Professor of Behaviour Change in Health (Brown), together with existing staff (e.g., Howlett) has provided for the development of a distinctive research cluster, and this infrastructural investment has resulted in large multi-partner grants (PHIRST, WRAPPED). The Unit has also developed collaborative international infrastructure through, for example, actively engaging with the EU COST programme on Problematic Use of the Internet. The associated network encompasses 38 countries with 120 researchers focused on establishing both the intellectual and operational foundations for international research on this important topic.

The Unit infrastructure also benefits from the NIHR East of England Research Design Service (RDS) being located in the School which provides facilities for the design and planning of research bids. Furthermore, there is a Clinical Trials Support Network (CTSN) that works closely with the Norwich Clinical Trials Unit (CTU) at the University of East Anglia, which arranges approval of, and support for, clinical trials. There have been 11 trials overseen by the CTSN within the REF period with grant value of £5.4M including one concerning OCD. The CTSN has also commenced a three-year technical and business development plan to seek approval as a CTU. This development plan entails over £200k of targeted investment by the School in experienced staff to deliver the standard operating procedures required for a full CTU infrastructure.

The University Library and Computing Service (LCS) maintains subscriptions to 220 information databases, of which around 60 relate to relevant Unit discipline areas. Discipline-specific bibliographic resources include SCOPUS, Education Research complete and PsycArticles while Serial Solutions are used to link to full-text articles giving seamless access to subscription content. From the 50,575 journal titles available, which is an 81% increase since 2014, 1400 are used by the Unit. The same subject categories hold 12,000 ebooks and 20,000 print books including a special collection, The Fransella and Miller Mair PCP Collection, comprising books and archival papers on personal construct psychology. Other resources include Anatomy TV and the TV/Radio archive Box of Broadcasts. To support research publication LCS have recently negotiated several transformative agreements (with Sage, Wiley, PLoS, BMJ) to facilitate gold OA and the Unit is supported by a dedicated LCS Information Manager.

4. Collaboration and contribution to the research base, economy and society***Research Collaborations and User Partnerships***

Unit staff collaborate with a wide variety of research partners worldwide.

In *Cognitive Neuropsychology*, Laws' research with clinician Fineberg on neurocognitive aspects of OCD is carried out in the context of the only UK national OCD centre, at HPFT. This collaborative research has centred on identifying a common cognitive endophenotype profile in people with a range of OCD-related disorders and papers have been published showing a common set-shifting problem across OCD, Body Dysmorphic Disorder, trichotillomania, and even healthy individuals with Obsessive Compulsive Personality. Laws also has important collaborations with McKenna (CIBERSAM, Spain), Sartori (Padua), Chamberlain (Southampton), Moreno-Martínez (UNED, Spain), Stoet (Leeds) and Jauhar (Institute of Psychiatry). Jenkinson's longstanding association with Fotopoulou at University College London (UCL) has led to his 0.4 FTE secondment to her large European programme grant. He also collaborates with Preston (York), Crucianelli (Karolinska Inst.), Moro (Verona), Paloyelis (Kings College London), Besharati (Witwatersrand) and Barak (Hertfordshire Community NHS Trust). Knight's research on spatial cognition involves close collaboration with Barry, Jeffery and Spiers (UCL).

The *Health and Clinical* research group works closely with the Centre for Health Services and Clinical Research (UOA3). Ludlow, Gutierrez, and Ryder collaborate with a variety of academic and community partners on the study, treatment and management of neurodevelopmental disorders, through the *PANDA* Unit (see section 1). They also collaborate with Franklin (Sussex), Simmons (Glasgow), Wilkins (Essex), Allen (Anglia Ruskin), Heaton (Goldsmiths), Reniers (Birmingham), Giner-Sorolla (Kent), and Russell (Surrey). Troop's *Psycho-haematology Research Unit* collaboration includes health trusts (Royal London, Barts, Queen Mary University London, Guy's and St Thomas', Whittington), as well as the Southern Academic Coagulation Consortium and the Haemophilia Society; this research resulted in grants (£89k) from industrial partners Bayer and Baxalta. Troop also collaborates with Schmidt and Campbell (Institute of Psychiatry), Andrews and Hisky (Essex), Oeuwens (Tilburg), Kupeli (UCL) and Hamalova (Bratislava). Through *Making Positive Moves*, this group collaborates with the South London & Maudsley NHS Trust, the University of Warwick, and Hertfordshire County Council. Done has research collaborations on the nature of delusions with Sharp (Early Intervention Service, HPFT), on psychotic patients with Peters (Institute of Psychiatry), on birth-cohort studies with Shepherd and Sacker (UCL), on psychological factors in long-term health conditions with Young (Essex & Herts CLRN) and Norton (UCL), and on adult schizophrenia with Leask (Nottingham).

In the *Movement* research group, Rose initiated research collaborations with Grahn (Toronto), and Delevoeye-Turrell (Lille). Lovatt fostered an international, commercial research collaboration with Qualtrics, co-developing a new data-collection platform, *Tap-a-Tempo*. Gurney's developmental work on gestures benefits from collaborations with Kirk (University of East Anglia – UEA) and Blades (Sheffield). Whyatt collaborates as co-author and co-supervisor with Craig (Ulster), Feeley (Rutgers Centre for Advanced Infrastructure and Transportation), Torres (Rutgers), and now with Rose (Lucerne).

The *Learning, Memory and Thinking* research group works closely with local NHS colleagues, including Visiting Professors Gale (HPFT) and Ashaye (Lister). As above, Kvavilashvili's work with Niedzwieńska (Krakow) was supported by a Marie Skłodowska-Curie Fellowship and a separate funded visit by Barzykowski. Kvavilashvili also collaborates with Gilbert and Brewin (UCL), Floridou and Williamson (Sheffield), Ford (Anglia Ruskin), Raune (Harrow & Hillingdon Early Intervention in Psychosis Service), Altgassen (Radboud), Schnitzspahn (Aberdeen), Fossati (ICM, Paris), Cole (York, St. John), Rummel (Heidelberg), Vannucci (Florence), Ortiz de Gortari (Bergen, and UH visiting Research Fellow), and Hornberger (UEA). Page has long-term collaborations with Norris (Cambridge), Duyck (Gent), Szmalec (Louvain) and Zamuner (Toronto), resulting in new research with Bogaerts (Amsterdam), Smalle (Gent) and Johnson (Bournemouth), extending the Page-Norris models of immediate serial recall and long-term serial learning (including Hebb effects) to word learning, child language acquisition, and reading.

Collaboration with Hüttig (MPI Nijmegen) gave access to a large cohort of participants in India, and he has worked recently with three local primary schools, applying serial-learning-theory to times-tables learning. During the COVID-19 pandemic, Markostamou worked on a major collaboration with researchers from 15 countries, on past and prospective memory during the crisis. She also works with Dijkstra (Rotterdam), Vulchanova (Norwegian University of Science and Technology), Tanguay and Davidson (Ottawa), Engelhardt (Coventry) and Renoult (UEA), Salvetti (Verona), Sperandio (Trento), and Kosmidis, Spandou and Tata (Thessaloniki). Georgiou collaborates with Erskine (St George's) on thought suppression and smoking cessation, as well as with Mair (York) on wearable memory aids. Recent cyberpsychology research complements his long collaboration on problem solving with Gilhooly (Emeritus), as well as new cross-group collaborations with Adler and McSweeney. In addition to her forensic work below, Akhtar undertakes forensic research on memory with Conway, Howe (City), Loveday (Westminster), Morrison (Bradford), Justice (Nottingham Trent) and Donaldson (St. Andrews).

In the *Forensic* research group, Adler and McSweeney collaborate in several interdisciplinary areas including with Broome-Gekoski consultants on research for the Independent Inquiry into Child Sexual Assault, and with Stevens (Kent) on drugs misuse. Adler is principal investigator on a project commissioned by the Home Office, managed by McSweeney with Georgiou as co-investigator. This centres on new analyses of crime data relating to fraud, cyber-crime and money-laundering, bringing together several national datasets, including one not previously accessible to any non-government researchers. As noted above, Adler led a cross-School interdisciplinary team (LMS, Law, and Health and Social Work) to obtain the Unit a place on the Youth Endowment Fund (YEF) evaluator panel. YEF is a £200M endowment, specifically targeted at interventions to reduce serious violence perpetrated by, and affecting, children aged 10-14. The team were commissioned in the first wave of funding to evaluate four interventions and have already been asked to design methodologies for adoption across all YEF evaluations. McSweeney collaborates independently with Red Quadrant and Russell Webster (consultants), the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), the Home Office (on Serious and Organised Crime, Research and Analysis), and with the International Society of Addiction Medicine.

As a consequence of the *Behaviour Change* research group's extensive research with Public Health organizations, Brown's and Howlett's collaborations are mostly covered in the succeeding paragraph. Howlett has, in addition, worked on systematic reviews of physical-activity interventions with Nyman (Bournemouth) and Cross (Derby); and with a range of University (Trivedi, Bottoms, Wellsted, Sharma, Mengoni, Jones, Wyatt) and external collaborators (Chater at Bedfordshire; Jones, Clarke, Turner, Swart and Murdoch at UEA; and Clarke, Wilson at Norfolk and Suffolk NHS Trust) on the READY project (NIHR HTA, £2.28M). His collaboration with Chater (Bedfordshire) extends to co-supervision and joint grant-applications. Fletcher's extensive European collaborations, on both the DO CHANGE Horizon 2020 Project (Do Something Different for Cardiovascular Health) and the DO-ACTIVATE EU-AAL Project (Do Something Different in MCI and Dementia) are outlined in the submitted Impact Case Study.

Contribution to Economy and Society

As the UK's first Chair in the Public Understanding of Psychology, Wiseman has engaged the public through books (including *The Luck Factor*, *Quirkology*, *59 Seconds*, *Rip it up*: over 3 million sales worldwide) and through his Quirkology YouTube channel (2.2 million subscribers; 880 million views). He collaborated with Marvin's Magic to produce *Mind Games*, a set of psychological illusions and science demonstrations, accompanied by the *Mind Tricks* Exhibition, originally shown at the Edinburgh Museum of Childhood, then toured around a variety of public venues. Wiseman has recently studied the impact of magic on wellbeing and education: three peer-reviewed papers made recommendations for future research and tested these in controlled trials. The techniques were shown to enhance engagement with education videos in a project with hand artist Will Houston, a finalist in the international *Falling Walls 2020* science-engagement competition. Wiseman is Board Member and Director of the Edinburgh Festival Fringe. The Unit has supported these impactful public-outreach activities through allocation of

0.4 FTE of Wiseman's time; their breadth and scale are probably unmatched by any UK psychologist.

The Unit's *Movement* research group have translated their Dance-and-Parkinson's research into events and services for people with Parkinson's and their carers. These have included, in June 2016, a full-day research conference, at which academics, medics, Parkinson's patients and carers were updated on the latest research. For over five years, the group have maintained a programme of weekly Parkinson's-tailored Dance classes, and these feedback, through patients' experiences/views, into the research programme via a Research Advisory Group. Unit support for Lovatt's public-engagement work seeded international collaboration with commercial partners Qualtrics, a good example of an impact-generating collaboration between researchers, patient/user groups and a commercial enterprise. The Unit's knowledge-exchange partnership (KEEP+) with Accessible Chair Yoga (a community-interest company developing seated yoga for people with mobility difficulties) developed from the same impact-oriented research strand. Gurney's research on gestures – that illustrates the potential influence of nonverbal cues in, for example, police interview situations – has generated a series of leaflets and workshops for Hertfordshire Constabulary, supported by University research impact funding.

In the Unit's *Behaviour Change* research group, Howlett, with Troop, the Herts Sports Partnership, and Chater (Bedfordshire) evaluated and developed a Sport England - and Hertfordshire County Council-funded community physical-activity intervention called *Active Herts*. As a result of this collaborative research, *Active Herts* includes optimized behaviour-change techniques in its intervention materials and their delivery. The materials/programme have been rolled out to neighbouring districts (e.g., Epping Forest). With Madden (UH Dietetics), Willis (Leeds) and Edmunds (Oxford), Howlett has evaluated and further developed a Department of Health funded project for parents of children at risk of obesity, for the charity HENRY (Health Exercise Nutrition for the Really Young; £108k Knowledge Exchange Partnership).

To realise widely the benefits of Unit behaviour-change research, Howlett was conference organiser, now Treasurer, of the Behavioural Science and Public Health Network (BSPHN). He has delivered six network events, each to over 200 attendees: Physical Activity: Influences and interventions (Sept 2016); Behaviour Change in Practice (Feb 2017); Integrating Health Psychology with Health Education and Training (Sept 2017); Appiness (Nov 2017); The Role of Behavioural Science in Public Health: Application and Impact (Feb 2018); Health, Well-Being & Behavioural Science; Building Successful Partnerships (Nov 2019). BHPSN is developing a new behavioural science strategy for Public Health England (PHE), embedding behavioural science into public-health practices. This newly reorganised network is playing an important role in the COVID-19 crisis, using academic knowledge to guide health prevention/promotion efforts nationally. With the Health Psychology Exchange (UK wide network of 100+ Health Psychologists set up during the COVID-19 pandemic) Howlett has produced two rapid reviews on public-health messaging during pandemics and on vaccination uptake. Finally, for the BPS Behavioural Science and Disease Prevention Taskforce he has authored three guidance documents on: physical activity, sedentary behaviour, and eating behaviour, specific to confinement during the pandemic.

Brown has a record of extensive collaborative engagement, applying psychological behaviour-change theories and data to the development of public-health interventions. She has an Honorary contract with PHE and has contributed to national strategies, including the sexual-health care pathway for school nursing, the female genital mutilation care pathway for the Department of Health, and PHE's Social and Behavioural Sciences Strategy. She provided expert testimony on the use of digital interventions for health behaviour change to the NICE Public Health Guidance Committee and, like Howlett, is a long-term Executive Committee member of the BSPHN, being its publication editor. As recipient of a first-round PHIRST grant (£1.2M, 2020), Brown leads a national network of public-health researchers, responding directly to public-health demands from health authorities from across the UK.

Through the Cube Project, which has developed low-energy microhomes, Page has carried out public engagement work on pro-environmental behaviour change and low-carbon buildings/behaviour, underpinned by joint psychological research with Dr Nadine Page (Ashridge/Hult). QB2 was an invited exhibit for the Green Zone at Grand Designs Live in Birmingham and London (2014, 2015) and QB3 at the Edinburgh Science Festival (2016). The Project was presented at a number of invited outreach events (Green Summit, Liechtenstein, 2014; Bristol Festival of Ideas, 2016; Atlantic College Sustainability Workshops, 2016, 2017; CIBSE Technical Symposium, 2018; and Building Sustainable Cities, 2019). The Cube Project involves an industry partnership with Bolton Buildings, who are the UK licensed manufacturer and distributor in the UK. With Weekes (Edinburgh) the project received a small business development grant from the EU Climate-KIC initiative and, together with Hertfordshire County Council, Page's project on low-carbon care homes was one of ten projects funded nationally by the Local Government Association Net-Zero Challenge Fund, 2020.

There is considerable collaborative external engagement by the Unit's DClinPsy staff and students, through extensive contacts with local psychological health services (particularly, HPFT and the East and North Hertfordshire Trust). This was reflected in the inaugural, annual Doctorate in Clinical Psychology Research Conference, held in September 2017 and attended by local stakeholders (including service leads and NHS colleagues), members from the wider Department, and current trainees. The DClinPsy team led seven programme events at the 2017 British Psychology Society (BPS) Community Psychology Festival in Bristol and, as a result, were invited and hosted the 2018 BPS Festival in Hertfordshire.

Contributions to Sustainability of Discipline

Unit staff make numerous contributions to sustain the discipline and its research base, in addition to those described above.

Journal editorships: Brown is Editor-in-Chief of the journal Behavioural Science and Public Health of which Howlett is also an Editor. Jenkinson served as Associate Editor for BMC Psychology. Kvavilashvili was Associate Editor of Memory (2011-2018) and guest editor of a special issue of Psychological Research on Spontaneous Future Cognition (2019). Laws is Section Editor for BMC Psychology, is on the Editorial Boards of PLoS One, World Journal of Psychiatry and ISRN Geriatrics, and is Associate Editor at the British Journal of Clinical Psychology. McSweeney sits on the International Editorial Board of Drugs: Education, Prevention and Policy. Whyatt is Assistant Editor at Frontiers in Integrative Neuroscience. Wiseman has served on the Editorial Board of BMC Psychology

Participation on grants committees: Laws was Chief Reviewer for the British Medical Association for schizophrenia grants; Troop has been commissioned as external expert on PhD and Fellowship applications at the Marie Curie Palliative Care Research Department.

Fellowships and prizes: Kvavilashvili is a Fellow of the Psychonomic Society; Wiseman was awarded an Honorary DSc in 2016 from Abertay University for his work in the public understanding of science. He received the Golden Grolla Award (2020, Italy) for his research into psychology and illusion.

Membership of Research Council or similar national and international committees: Adler works closely with the Parliamentary Office for Science and Technology, contributing to POST Note 0608 (online safety) and, relatedly, to Rwanda's Child Online Protection Policy. She is the academic advisor to the steering committee of the Justice Data Lab (run by the Ministry of Justice with oversight coordinated by New Philanthropy Capital). She is also the academic advisor to the Bedfordshire Police Violence Reduction Unit, a role deputised by McSweeney, and is a member of the academic advisory panel to the Ministry of Justice Research and Youth Justice Board Academic Liaison Network. Georgiou is a Committee member of the British Psychological Society Cognitive Psychology Section and is a founding Committee Member of its new Cyberpsychology Section. Jenkinson is a Trustee of the International Neuropsychology Foundation.

Invited keynotes, presentations, or conference chair roles: Howlett served as conference organiser for the Health Psychology in Public Health Network (HPPHN). Jenkinson has organised symposia for the British Neuropsychological Society, International Neuropsychological Society and Federation of the European Societies of Neuropsychology. Kvavilashvili was a member of Scientific Advisory Boards for the Organising Committees of International Conferences on Prospective Memory (2014-2019). She was an invited member of the Programme Committee of the XIII International Conference of the Society for Applied Research in Memory and Cognition (2019). Wiseman gave the invited, opening address at the 2017 CSICON conference (Las Vegas), and keynote presentations at New Scientist Live (Excel, London), at the Science of Magic Conference (Goldsmiths University), and at the Northeastern Conference on Skepticism and Science (New York City). He gave invited keynote talks on science communication to The Dutch Research Council (2018) and Royal Flemish Academy (2019) and is one of few psychologists to have been the subject of BBC Radio 4's *The Life Scientific* (October 2019).

Refereeing activities: Howlett reviews grants for the NIHR RfPB and PGfAR funding streams. McSweeney has served as an invited peer-reviewer for the United Nations Office on Drugs and Crime's Universal Treatment Curriculum (2019) on '*Alternatives to Incarceration*' for illicit drug-using offenders. He has served in a similar advisory capacity with the World Health Organisation, Council of Europe and recently authored a policy paper, on alternatives to coercive sanctions, for the European Monitoring Centre for Drugs and Drug Addiction. Troop reviews grant applications and end-of-programme reports for several research councils (MRC, ESRC and NIHR).