

Institution: Keele University
Unit of Assessment: UoA4 Psychology, Psychiatry and Neuroscience
<p>1. Unit context and structure, research and impact strategy</p> <p>1.1 Overview of context and structures</p> <p>Keele Psychology has developed a vibrant and inclusive environment which embraces research approaches from across basic and applied psychological science. Since REF2014, we have significantly enhanced our reputation as a world-leading centre for cognitive, social, health, and developmental psychology. Within these domains, we have developed new areas of expertise, including the study of policing, crowds, and security; cognitive neuroscience; vaccination behaviour; and developmental forensic psychology. Our enhanced excellence over the REF2021 assessment period is reflected in the quality and scope of our published work (including Nature Human Behaviour, Psychological Science, Scientific Reports) spanning quantitative, qualitative, and physiological approaches; the development of outstanding international impact through external partnerships (e.g. Keele Policing and Academic Collaboration); and our increased capability to attract and deliver large-scale research projects that are externally funded by UKRI and others, amounting to £2.4 million awarded during the REF period (£1.1 million in REF2014).</p> <p>We have particularly focused our strategy upon attracting and providing a nurturing research environment for excellent Early Career Researchers (ECRs) to develop sustainable externally funded research programmes. This has generated the award of three separate ESRC new investigator grants totalling £647K to female ECRs and a Marie Curie Global Fellowship. Our academics have increased engagement in the national and international scientific community as editors and board members of major journals (e.g., Nature Scientific Reports, British and European Journals of Social Psychology) and through leadership of national and international scientific organisations (e.g., EPS, ISPP, BNS, BPS). This includes strong engagement with the movement for open and replicable science in institutional and wider structures.</p> <p>Our success has arisen through targeted infrastructure investments (e.g., new EEG laboratory, brain stimulation lab, virtual reality laboratory, child-friendly observation lab), supporting expansion of our national and international networks, tailored support and training for existing staff, and ten new or replacement research-led appointments that aligned with our strategic aims for enhancing our research. Our aim going forward is to play a central role in addressing global challenges through development of our partnership with Keele's interdisciplinary research Institutes of Social Inclusion, Global Health and Sustainable Futures by providing behavioural insights from across a broad range of psychological approaches. Further alignment with these global funding priorities will provide a strong basis for further developing our vibrant and sustainable research environment.</p> <p>Unit Structure and Groups</p> <p>Psychology is one of five Schools within the Faculty of Natural Sciences and comprises 19 research active academic staff. Two staff work part time and Huang's applied, and interdisciplinary work has been submitted to UoA20 (hence 16.8 FTE in UoA4). We have three thematic research groups which represent core and emerging areas of research excellence in: Cognition, Brain and Behaviour; Social and Developmental Psychology; and Health and Wellbeing. The boundaries between these groups are open and several researchers are linked to two groups. This structure fosters coherence and expert peer feedback within groups, whilst also providing opportunities for collaboration and cross-fertilisation between groups. Each group is led by a senior academic who organises regular group meetings, provides research strategy guidance to staff, reviews biannual staff research plans, and coordinates opportunities for group development, funding, and interdisciplinary collaboration. The social and developmental group is co-led to represent the two constituent strands equally.</p>

Since REF2014, we have focused on three goals with respect to our research group structure. First, we have focused on strengthening and broadening our expertise in cognitive, social, and developmental psychology to ensure that we produce outputs of the highest standard on issues aligned with University and international research priorities. Second, we have developed a new group in Health and Wellbeing which seeks to address contemporary societal issues including vaccination, medical screening engagement, mental health, ageing and neurodegenerative disease. Finally, we have developed a clear focus on responsible and sustainable governance (e.g., policing, security, mass emergencies, courts, law) which builds on external and interdisciplinary links to deliver impact. The approach to this has been guided by an appreciation of psychology as a broad discipline, a strong emphasis upon interdisciplinary collaboration, and the overarching university research strategy built around themes of global health, social inclusion, and sustainable futures.

- Cognition, Brain and Behaviour:** This group has 7 core members (Brooks, Edelstyn, Grange, Laurence, Spotorno, Stephens, Williams) and conducts theory-driven investigations of cognitive control, memory processes, emotion, visual perception, and attention. The group uses a broad array of methods, including computational modelling, neuropsychology, eye-tracking, behavioural studies, and physiological approaches. Infrastructure and staffing investments (two Lecturers and one Senior Lecturer; Laurence, Spotorno, Brooks) since REF2014 have now incorporated cognitive neuroscience approaches including EEG, brain stimulation methods (e.g., tACS, TMS), and further capacity for high resolution and mobile eye-tracking. In line with University and international priorities around global health, the group investigates the effects of ageing and neurodegenerative diseases on cognition (Edelstyn, Williams, Laurence, Spotorno, Grange) and explores the links between cognitive control processes and mental health (Grange) and pain perception (Stephens). In addition to the core members, Sherman (Health) and Andrews (Developmental) are affiliated with this group through their research on memory and child interviewing, respectively, which draws on cognitive theories and methods. The group has attracted funding from NIHR (Edelstyn), two ESRC new investigator awards (Williams & Laurence), an independent Marie Curie Global fellowship (joint with Washington University, USA) and an externally funded partnership with Nurofen supporting research about the analgesic effects of swearing (Stephens). Laurence's ESRC funded work on face-recognition within the context of security is linked with our interdisciplinary policing initiative (see KPAC below).
- Social and Developmental Psychology:** This group has 10 members (Andrews, Cakal, Huang*, Kapitany, Kent, Khan, Noor, Rotenberg, Stiff, Stott) and focuses on developing and applying social and developmental psychology theories to issues of global health, social inclusion, security, policing, terrorism, mass emergencies and sustainable governance in line with University research and impact priorities. This includes studying a range of interlinked issues such as trust, forgiveness, identity, group processes, intergroup relations, religion, social communication, online behaviour, and interactions with policing and justice. The group employs qualitative and quantitative methods including ethnographic, action-oriented, survey, and experimental approaches and has developed strong interdisciplinary links and publications with the social sciences such as criminology (Stott, Andrews), linguistics (Kent), and social policy and law (Huang). Since REF2014, the group has been strengthened through seven new and replacement appointments (Lecturers: Andrews, Cakal, Huang, Kapitany, Khan, Noor; one Professor: Stott) and the formation of the Keele Policing Academic Collaboration (KPAC; see below), led by Stott, which is a partner in funded multicentre (LSE, Oxford, Sussex, St Andrews, Keele) projects bringing over £1.1 million to Keele. Work in KPAC has created significant impact in policing policy, training, and practice internationally as documented in one of our impact cases. Other researchers in the group have attracted funding from, for example, an ESRC new investigator award (Andrews), the British Academy (Kapitany, Noor), a major grant from the Swedish Research Council (Khan), and the Turkish Government (Cakal) as well as through direct partnerships with UK police organisations (e.g., Staffordshire Police). The group has also developed significant international links with India through a UK-India Education and Research Initiative (UKIERI) grant aimed at building research capacity and developing more culturally sensitive social psychological approaches to address contemporary challenges faced by Indian society (Cakal, Khan, & Stott).

Developmental researchers in the group (Andrews, Huang, Kapitany) benefit from Keele's long-standing Children & Young People's Network which facilitates external partnerships (more below).

- **Health and Wellbeing Psychology:** This new group has two core members (Lamont, Sherman) with strong cross-membership from the other groups (Cakal, Edelstyn, Kent, Khan, Williams). Members examine and promote health-seeking behaviours and outcomes through programmes that are co-created with charities, users/patients, health care professionals and parents or caregivers. This includes work regarding the role of music in wellbeing (Lamont), cognitive decline and ageing (Edelstyn, Williams), the role of culture, conflict, and identity in health risk perceptions (Cakal & Khan), and the uptake and perception of vaccination (Sherman). As detailed in one of our impact cases, Sherman's work on vaccination and screening played a role in the UK government's 2018 decision to vaccinate boys against HPV and has established key relationships with medicine and epidemiologists (Keele, Leicester, Kings). The group is gathering momentum with publications in PLOS One, Social Science & Medicine, Psychology & Health, and other health psychology and interdisciplinary journals and funding awards from Horizon 2020, the NIHR, Wellcome Trust, Marie Curie, and a local hospital charity.

In addition to our core research groups, there are three embedded cross-cutting organisational Centres which support research.

- The interdisciplinary **Keele Policing Academic Collaboration (KPAC)**, directed by Stott, provides a framework for facilitating and enabling the achievement of impact through the co-production of knowledge between researchers in psychology (social / developmental / cognitive), criminology, law, and external partners in policing, other emergency services, government and the judiciary. It currently employs four full time postdoctoral researchers and is supported by a full time Centre Manager, a Professor of Practice, a Research Fellow and multicentre grants bringing ~£1.1 million to Keele. The Centre has formal agreements with the Office of Police and Crime Commissioners and Police forces of Staffordshire, Warwickshire, West Midlands, and West Yorkshire. It is also underpinned by security clearances and data sharing agreements which facilitate access to valuable data sources that support impact-generating research publications. KPAC also supports an impact pipeline funded by ESRC and UKRI awards that will extend into the next REF cycle including new grants (from 2020) amounting to £1.6 million. Three affiliated ECR appointments provide pathways for additional new impact: Laurence (face recognition within a security setting); Andrews and Huang (cognitive and cultural factors in child forensic interviewing).
- Our **Children and Young People's Network (CYP)** brings together researchers and practitioners with an interest in children's social and cognitive development, health, and well-being. CYP actively develops and maintains relationships with external partners such as local schools, theatres, social enterprises, charities, and youth groups. The network currently has 88 members including affiliates from other universities (Staffordshire, Manchester Metropolitan, Chester), health services, and the third sector. This valuable resource supports participant recruitment and sharing of best practice in developmental work (e.g., July 2020 webinar with speakers from NYU and UCL).
- Our **Qualitative Research Forum** promotes a supportive research community committed to high-quality qualitative research across our social, developmental, and health and wellbeing groups. The group organises training seminars and discussion groups, provides strategic input around qualitative methods and maintains our qualitative research lab which is equipped for secure recording, storage, and analysis, of multichannel digital audio/video and textual data. This resource has facilitated sensitive data sharing and grants from Staffordshire Police (Kent), for example.

Strategic decisions regarding research activities, targeted infrastructure investments, and new appointments are made at monthly Research Committee meetings where research group leads represent group interests with the Research Director (chair), Head of School, PGR director, impact champion, and early career and diversity representatives. This structure facilitates inclusive and transparent research strategy and resource allocation by representing the broad methodologies,

topic areas, and staff within the Unit. The Research Director leads research strategy development and represents research on the School's Senior Management Team and at the Faculty of Natural Sciences research committee (chaired by the Faculty Research Dean, Stott) to align School research activities with the broader research environment.

1.2 Research and Impact Strategy

Strategic Objectives Since REF2014

Over the assessment period, we have focused on the first phase of increasing our research capacity through recruiting ambitious staff who have increased our external income and partnerships, enabling sustainable research and impact programmes. Upgrading our laboratory infrastructure and organisational structures has also contributed to the goals set out in our REF2014 future strategy.

Grant Income: We have more than doubled the value of grants awarded in the current REF period (£2.6 million) compared to the REF 2014 period (£1.1 million) despite only a 15% increase in our FTE. This increase in grant capture success is now filtering through into our annual research income spend which was 60% higher in the last two years compared to the average across REF2014 (adjusted for FTE). This demonstrates the success of our strategy to attract high quality competitive ECRs, provide grant writing support to staff more broadly, target global challenges, build networks to join multicentre projects, and attract new senior staff. This provides a strong basis for continued growth going forward and is already being realised with multicentre grants totalling ~£2 million carrying forward and newly secured in early 2020-21.

PhD Student Numbers: Our PhD student enrolment has increased by 70% compared to REF2014 with a 56% increase in PhD students per annum per staff FTE. This is already feeding through into PhD awards with a 30% increase in the per annum number of awards in the last two years compared to the average per annum number in REF2014. This has come about through School and Faculty investment in studentships as well several externally funded students (e.g., Turkish government, charities).

Interdisciplinarity, External Partnerships, & Impact: Through targeted appointments, staff networking support, and internal impact support funding, we have developed large scale and sustainable external and interdisciplinary partnerships which have produced outputs and substantial non-academic impact. The Keele Policing Academic Collaboration (described above) was a major development and facilitates interdisciplinary (criminology, law, social policy) academic research and impact on practice within national and international police and justice organisations. Our appointments of Stott, Huang, Laurence, and Andrews along with existing staff (Kent, Communications/Linguistics) provide a strong basis for further development. Kapitany's research on cultural evolution and rituals has interdisciplinary links with Oxford Anthropology and the Evolutionary Systems group in Keele Computing. Sherman's HPV vaccination work involves close partnerships with medicine and epidemiology (see impact case) which are currently providing a basis for a new focus on COVID vaccination uptake and policy. Interdisciplinary publications include outputs in Philosophical Transactions of the Royal Society: B, Applied Linguistics, Current Anthropology, PLOS Computational Biology, Social Science & Medicine, and Sexually Transmitted Infections.

Expand research infrastructure: We have made substantial investment in our research infrastructure. This includes new investments in a state-of-the-art EEG laboratory, brain stimulation (TMS, tDCS, tACS), MRI access at Liverpool, a child-friendly laboratory, a new digital observation lab, a new virtual reality laboratory with eye-tracking, and licenses (and staff training) for online testing platforms (e.g., Qualtrics, Gorilla). These investments have allowed us to develop cognitive neuroscience, collect more diverse samples online, and support our new appointments in forensic and developmental research.

Research Integrity & Open Science: This Unit is at the forefront of an open research environment. All research outputs are made openly available, which began well in advance of the current REF open access policy. Beyond this, our staff and PhD students have significantly increased engagement with the open science and reproducibility movements and are providing leadership more widely at Keele and beyond. Grange has been an active member of the Reproducibility Project since 2011 and co-authored a 2015 Science publication titled 'Estimating the reproducibility of psychological science' which has been cited over 4779 times (30 Oct 2020). We regularly pre-register studies and participate in large scale replication projects published in major journals such as Nature Human Behaviour (Noor, 2020) and Psychological Science (Sherman & Grange, 2020).

Psychology staff are now leading research integrity initiatives across the University (Grange, University lead; Sherman, Faculty lead) and have effected institutional change. For instance, Grange effectively lobbied for inclusion of open science and reproducibility engagement as a new promotion criterion and ensured that all Psychology academic job advertisements emphasise our value of open and reproducible science. Internal staff and PGR development sessions and invited speakers have focused on developing skills for data/materials sharing (e.g., OSF registration and usage), effect sizes and power, use of open-source software (e.g., R), and Bayesian statistics. Our leads also keep in touch with national networks on open science (e.g., BPS Open Data Sandpit, Feb 2020). Importantly, our PhD students are engaged and have led international online events about open and reproducible science (section 2.2).

Future Strategic Objectives

Phase two of our strategic vision has begun to build on our now established research capacity. We will consolidate and grow as a world-leading centre providing social and behavioural input to interdisciplinary collaborations around global challenges, including Keele's research themes of social inclusion, global health, and sustainable futures. Understanding and predicting human behaviour is central to these themes. Generating interdisciplinary links with academic and other external partners will further increase our capacity to be competitive for large scale strategic funding in these areas and enhance the vitality and sustainability of our research programmes. To achieve this, we will invest further in growing our research expertise within morality, decision making, translational neuroscience, policing/justice, applied social and political psychology, health psychology, and links between these areas. We have started this process by appointing Prof Abigail Locke (critical social/health psychologist) as the new Head of School (Oct 2020), two new lecturers starting in Feb 2021 (Francis, moral decision making; Scott, sleep & health), and will make further planned appointments in 2021-2022.

Develop new impact: Building on our very successful impact strategy since REF2014, we will broaden impact across all research groups by strengthening existing partnerships (e.g. KPAC policing during COVID, COVID vaccination uptake) and supporting new external partnerships. For instance, Keele's new interdisciplinary £1.9 million SIMULATE project is providing opportunities for impact around the social, moral, and cognitive factors in engagement with environmental and societal sustainability. Recently secured (Sept 2020) funding will support translation of our memory research to neuromarketing (~£200K KTP; Edelstyn) and will create opportunities for impact on mental health provision in conflict zones (~£300K ESRC, Cakal). We embed the impact agenda throughout our research funding applications and the School Impact Lead (Sherman; current impact case) will support the development of new impact and partnerships for all staff.

Further increase research income: Building on our success with large multicentre and ECR grants, we will aim to further increase and diversify research income by focusing efforts on large grant bids with full economic costing, post-doctoral staffing, and strong external partnerships. This will create sustainable research programmes and increase the vibrancy of our research culture. This will be done through increased focus on global challenges, network building, mentorship, peer review (internal and external), professional grant writing support, and supporting our current and new ECRs to continue to larger programme grants and mid-career fellowships.

Expand PGR funding streams: We will increase PGR funding streams to further enhance the vibrancy of our research atmosphere and support staff research programmes. This will be done through an interdisciplinary Leverhulme Centre bid, by developing new pathways into the Northwest ESRC DTP, industry co-sponsorship, and interdisciplinary supervisory collaboration via Faculty Scholarships. We will work closely with the University's new Keele Doctoral Academy (Director, Lamont) to develop new opportunities for the School and to explore interdisciplinary links based around the University's thematic priorities.

Research Integrity & Open Science: Psychology will continue to lead initiatives promoting research integrity and open science at Keele and more broadly. We will build on our already strong engagement with open and reproducible science by increasing (where appropriate) pre-registration, data/materials sharing, use of open-source software, and Bayesian statistical approaches through embedding these in our internal funding criteria, PhD student project planning, and staff research plan forms. This will be coupled with continuing work to enhance research methods rigour and openness throughout our BSc, MSc and PhD programmes (e.g., transitioning to R for statistics, enhancing ethics education). Going forward, we will ensure that our initiatives are inclusive of different approaches across the School. We will also encourage evaluation of existing methods and new methods development (e.g., Brooks, new ERP region-of-interest approach; *Psychophysiology* 2017) as part of staff research programmes.

2. People

2.1 Staffing strategy and staff development

Staff Recruitment: Our research staff base has undergone a ~50% turn-over since 2014, which has allowed us to realise key aspects of our research and impact strategy and, in turn, to capitalize on the talent and transformational impact of a revitalised staff body within this REF cycle. We have made two senior researcher appointments (Stott to Chair and Brooks to Senior Lecturer) and eight junior researcher appointments (Andrews, Cakal, Huang*, Kapitany, Laurence, Khan, Noor, Spotorno). The strategic appointments of Stott, Cakal, Khan and Noor repositioned our social psychological research group to focus on the role of identity in behaviour, social processes, and political issues and to make use of multidisciplinary frameworks (e.g., Khan with health, Stott with criminology, Noor with politics) in line with university research themes. The appointments of Brooks, Spotorno, and Laurence has established a perception cluster within Cognition, Brain, & Behaviour and has allowed us to incorporate cognitive neuroscience approaches such as EEG and brain stimulation into our research while also providing opportunities for external applications (e.g., face recognition in security and ageing). The appointments of Andrews, Huang, and Stott has established a clear group of expertise focused on forensic psychology, law, and policing and realises our plan to develop expertise in sustainable governance, capitalise on external partnerships (e.g., police), and build interdisciplinary connections. Through extensive networking and wide advertisement, we have attracted staff from excellent institutions (e.g., Cambridge, Oxford, Aberdeen, Exeter, Leeds, Kent) who have created an engaging and dynamic research environment. We are continuing this approach early in the next REF period with four new appointments including Prof Abigail Locke as Head of School of Psychology (Oct 2020; social/health) and lectureship posts focused on moral reasoning and decision making (Francis) and sleep and health (Scott) which will further our alignment with global challenges and our university-wide Institutes of Global Health and Sustainable Futures.

In addition to research appointments, the School has invested in a 6.2 FTE team of Education and Scholarship (E&S) academic staff. This has a pedagogic foundation, but E&S led innovations in educational delivery will create efficiencies that benefit research staff time (especially ECRs). Already, this structure is allowing research staff to focus on student project supervision and specialist teaching aligned with staff research expertise.

Impact and interdisciplinary strategy: Stott's appointment was a key strategic move to provide leadership for our interdisciplinary research agenda and development of world class impact. He brings a prestigious track-record in conducting impactful research and is central to providing

support and guidance on the development of impact within the unit. Stott also established KPAC, a dynamic and cross cutting research Centre, informed by social psychological and criminological approaches to policing. It acts as a platform for knowledge co-production with external partners. Critically, it provides a strong interdisciplinary base for at least five of our academics and four funded PDRA staff and research fellows to access research data and collaborations with police and justice organisations aligned with our theme of sustainable governance. KPAC will provide a strong basis for new ESRC-funded impact on child witness interviewing (Andrews, Huang) and face recognition security (Laurence). Going forward, we will seek to develop additional pathways to impact aligned with our global health and social inclusion themes. Sherman's impact case on influencing government policy on HPV vaccination has established important academic (e.g., Kings College London) and non-academic partnerships that will underpin relevant new impact on wider vaccination policy, perceptions, and uptake (e.g., COVID). We will also exploit existing business relationships (e.g., neuromarketing: Edelstyn) to access Knowledge Transfer Partnership (KTP) funding schemes and create partnerships for knowledge exchange and impact.

Staff Development: Our staffing strategy is guided by Keele's People Strategy (2015-20). This strategy commits the university to principles of equality, diversity and transparency. We provide regular training activities for all staff (including post-doctoral staff) to underpin the achievement of our research aims. We have particularly focused on training related to grant writing, research skills, open science, and leadership. This has contributed to our three successful ESRC new investigator awards. External consultants provided two group grant writing workshops coupled with one-to-one follow-up sessions to support individual staff funding targets. This is in addition to the standard support offered through internal peer review of grant applications and the University's research and innovation support enhancement (RaISE) team. RaISE provides professional support for research development, project planning, costings, and identifying funders. Research skills training has focused on open and replicable science including workshops focused on use of R, Bayesian statistics, open science framework, Gorilla, and PsychoPy aimed at increasing the openness and rigour of our outputs. Staff in leadership positions have been supported with training opportunities through external consultants (e.g., Instep) and the Aurora leadership development initiative. In addition, we hold annual research away days in January to provide staff with activities to develop research strategy, reflect on research progress, and enhance skills. Staff are also supported through the research budget to attend international conferences and training workshops to develop new skills and academic networks.

Biannually, staff update their written five-year research plan and discuss it with the Head of School (summer) and their research group lead (mid-year). These discussions support staff to develop strategic research plans, align with funding priorities, and facilitate progress toward promotion. Of our 19 research active staff, one has been promoted to Professor (Lamont), and six to senior lecturer (Grange, Kent, Khan, Noor, Stiff, Williams) during the REF period. Research plan meetings also give group leads insight into the development/infrastructure needs of their members and highlights opportunities for collaboration inside and outside of the School. Research leads feed these insights to research committee to inform strategic decision making.

The School runs a sabbatical scheme with entitlement to one semester of leave in every seven semesters. This regularity ensures that staff can incorporate sabbaticals into their strategic five-year plans. Sabbatical plans must focus on enhancing the profile and sustainability of staff research. This typically involves preparation of major (> £100K) grant applications, high-profile publications, and partnership development. The School typically supports 2-4 sabbaticals per annum. During the current period we granted 14 sabbatical requests (100% of applications), more than double the number of sabbaticals in the REF2014 period.

Staff have access to a School-based Research Support Fund (RSF) and Faculty of Natural Sciences Research Development Fund (RDF). These funds provide seed funding to support pilot data and research assistance for grant bids, infrastructure development (e.g., equipment, software licenses), and networking and conference attendance. The School research budget had approximately £25K per annum across the period and the Faculty RDF can support additional bids. For example, in 2018-19 the School was successful in obtaining £22K to support online data

collection, impact development and research assistance. Staff also access internal funding through the University's thematic institutes (e.g., social inclusion, Lamont & Rotenberg; Institute of Liberal Arts, Noor).

To support research delivery, the School funds a 0.5FTE administrator. A further 1.0 FTE administrator supports KPAC activities. The School also funds an experienced 1.0 FTE senior technician who provides support for specialist psychology software (e.g., PsychoPy, Qualtrics) and laboratory equipment. Our technician's skill development has been supported as part of cognitive neuroscience infrastructure investments (e.g., training workshops on EEG, python, virtual reality, and others).

2.2 Research students

In line with our strategic goal from REF2014, we have steadily increased our enrolment of PhD students from 8.5, on average, in REF2014 to 17.7 (+108%) in 2019-20. Most of our newly appointed staff are supervising at least 1 PhD student, as lead or second supervisor. Completions (currently 15) will grow as our increased enrolments finish their degrees. This growth has come about through new School and Faculty funded studentships, as well as external partnership funding aligned with staff research priorities (e.g., Turkish and Saudi governments, charities). We provide our students with a supportive and ambitious environment for research training and focus on including PhD students as partners in our research environment. Importantly, we support PGR students with ring-fenced funding in the School's research budget, a Faculty PGR training budget, and structured feedback through supervisions, progression panels, and research group presentations to facilitate timely completion and publication.

Recruitment: Our recruitment procedures ensure that proposed projects are aligned with staff expertise, are congruent with School resources/facilities, and have a clear publication plan. For internally funded studentships, staff project proposals are considered competitively and selected for strategic alignment with research priorities and staff research plans. PhD studentships are advertised through findaphd.com, jobs.ac.uk, and appropriate specialist mailing lists. We have also developed externally funded recruitment pathways through a series of successful bids to the Turkish Ministry of Education (x4) and the Saudi Arabian government (x1).

Supervision, Monitoring, and Support: The Code of Practice on Postgraduate Research Degrees (PGR CoP) (revised 2016-17 and continuously updated by the Postgraduate Officer) is the framework through which Keele University delivers its postgraduate research (PGR) degrees. Each PGR student is supervised by at least one primary and one secondary supervisor with relevant expertise. At least one of the supervisors must have successfully supervised a student to completion. All PGR students develop a training plan as part of their Personal Development and Learning Plan. PhD students' progress and training needs are regularly assessed with their supervisors through a series of annual progress reviews and interim progress reports (between annual reviews). These are overseen by the School's Director of Postgraduate Studies and Faculty Postgraduate Research Students committee. At the end of year 1, the annual progress review includes a viva voce examination based on a 5,000-word literature review and a 2,500-word research plan. This review by independent staff members ensures that students and supervisors have a clear and realistic plan of research (including publication plans) and supports the students to identify any training needs. In addition to any informal lab and supervision meetings, students in years 2 and 3 attend formal interviews with their supervisory teams to plan their thesis chapters and papers for publication. This steady support, especially around publication, has led to many of our students publishing peer-reviewed papers during their degree in excellent outlets including JEP:HPP (Kowalczyk), British Journal of Psychology (Hult-Khazaie), Social Neuroscience (Dundas), Frontiers in Neurology (Martini), Psychopharmacology (Holloway), Health Psychology (Roberts), and British Journal of Developmental Psychology (James).

Our students regularly present their work-in-progress to the School's relevant research groups and all students present at the School's annual Postgraduate Research Conference which is

attended by staff and a student-nominated external keynote speaker (Dr Andrew Stewart, Manchester in 2019). To support early career networking, our students are supported to have joint lunch and 1-to-1 meetings with our weekly external seminar series guest speakers.

Students' Personal Development and Learning is central to our progress monitoring reports in alignment with national standards including the Roberts 'SET for Success' report, Vitae Researcher Development Framework, and the expectations of Research Councils UK. In line with Keele's Code of Practice for Research Degrees, PhD students must obtain a set number of PDLP (Personal Development & Learning Plan) points each year by attending postgraduate training courses provided by the University (and externally) on topics such as conducting systematic reviews, thesis and viva preparation, and project planning. Within our School, students are offered generic skills training (including impact-related topics such as interacting with the media, collaborating with non-academic beneficiaries, and conducting translational research as well as specialist skills training (e.g., Bayesian Data Analysis, MatLab, R, EEG, neural network modelling, eye-tracking, tDCS, Grounded Theory, Conversation Analysis). Students can also apply for Faculty funding to support specialist external training seminars (e.g., workshop on multivariate pattern analysis of EEG data in Magdeberg, Germany in 2019). To support research projects, the School has a ring-fenced PGR research budget to support attendance at international conferences (e.g., Psychonomic Society) and research expenses (e.g., participants, online samples, consumables). Additionally, our PhD students have full access to the School's Research Participation Scheme for participant recruitment. All students are also members of Keele's Doctoral Academy (launched 2020).

All PhD students have access to their own desk and computer with appropriate specialist software (e.g., Matlab, SPSS). Students share spacious offices with 4-6 other students from other groups to encourage co-productive working and peer support. To represent PhD student interests and develop strategy, we have a postgraduate research (PGR) committee which comprises PGR student representatives, the PGR director, and 2-3 other academics. PGR committee meeting agendas are co-created with student representatives and co-chaired by them. In addition, the entire student cohort meets with the PGR director each year for a working lunch to discuss obstacles to and opportunities for their collective research progress. PhD students are invited to all School-wide committee meetings, research away days, training events, and research success celebrations (e.g., for major papers and grants) so that they are integrated into the culture of the School.

Our PhD community is proactively engaging with open science practices. In their annual progression meetings, students are required to reflect about their engagement with open science practices. Our students are also at the forefront of promoting Open Science practices at an international level. For example, recently in 2019 Robertson was a key co-organiser (with colleagues at Oxford, Cambridge, UCL) and chair of an Open Science Webinar with Brian Nosek as a keynote speaker. Collectively, our PhD students have committed themselves to increase data sharing through public platforms and repositories (where possible), such as the Open Science Framework (OSF) and to increase the number of pre-registered studies in PhD project plans.

2.3 Equality and diversity

A School Equality, Diversity and Inclusion (EDI) strategy provides the framework for supporting the recruitment, career, and skill development for all staff and students including women, BAME staff, and other protected groups across all levels of seniority/role. This led us to achieve a departmental Bronze Athena Swan Award in 2013, which has since been renewed in 2016 and 2020. A School EDI champion (Williams) leads the School EDI committee which implements the Athena SWAN action plan, encourages good practice, works to affect cultural change, and ensures representation of EDI at all levels of school activity (recruitment, induction, workload allocation, mentoring, skill development, internal research funding, sabbatical leave, promotion, flexible working). EDI is a standing item on all School and research committee agendas. Research committee has an ECR representative and includes the School EDI lead to ensure inclusive

decision making in research strategy and resource allocation (including funds to support conference attendance and research projects).

Equal representation, equal opportunity, and fairness are critical factors in allocation of roles. Our workload allocation model is fully transparent and provides summary information about how research, teaching, and administrative workload is balanced across gender, research group, and seniority level. Administrative roles are advertised for expressions of interest with a clear role description. We monitor effectiveness of EDI strategy through annual staff and student surveys about training, promotion, workload, culture, challenges, opportunities, and morale. Our work is tied into wider University (Sherman as the Faculty-wide EDI lead) and national EDI activity (e.g., Sherman co-authoring a BPS survey and report on UK-wide Psychology Department experiences of Athena SWAN in 2017).

Of our submitted staff, 50% of professors (Edelstyn & Lamont) and 47% of lecturers and senior lecturers are women. Four out of the 10 recruitments for research active academics during the current REF period were women (Andrews, Huang, Laurence, Spotorno; 40%). We have also made good progress on increasing BAME staff representation. Three of our ten (30%) recruitments in this REF period indicated that they were BAME. Job adverts highlight the School's commitment to EDI and encourage applications from female and BAME candidates to all positions advertised by the School. All staff who sit on recruitment panels undergo selection and recruitment training, including Unconscious Bias training. When possible, recruitment panels consist of an even distribution of men and women and have BAME representation. Women who are returning to research after a period of maternity leave can be supported by the Academic (Maternity) Returner's Fund.

On request, staff and PGR students have been enabled to work/study part-time or flexibly to balance caring responsibilities and/or generally achieve a better work-life balance (e.g., one 0.2 and one 0.6 staff submitted). The School also actively considers caring responsibilities and part time staff/students when scheduling meetings/events/training/emails to create an inclusive environment.

3. Income, infrastructure and facilities

3.1 Income

During the REF2021 period, Keele Psychology was awarded grants totalling £2.6 million, an increase of 56% per annum compared to the total funding secured in the REF2014 period (£1.1 million). We draw these from three broad areas. First, as a priority, we have increased the number of larger grant applications (over £50K) by 78% and this has led to 55% of our new income resulting from targeting UKRI (ESRC and EPSRC; Stott, Laurence, Andrews, Williams). The value of ESRC awards alone has increased more than ten-fold since REF2014. We have also had success with NIHR, Swedish Research Council, EU Horizon 2020, and UK-India Education and Research Initiative. Second, we have also successfully targeted UK charity funding bodies such as the British Academy (BA/Leverhulme; Laurence, Noor, Kapitany), Experimental Psychology Society (Brooks, Grange), and Wellcome Trust (Sherman) to support small and medium size projects. Finally, we also receive funding from a range of industrial, government, and charity funders including Betsi Cadwaladr NHS University Health Board, Turkish and Saudi governments, English Football League, Gålöstiftelsen charitable foundation, Marstons plc, Nurofen, GambleAware, Staffordshire Police, and West Midlands Police. Some of these partner awards (and ESRC) have supported research that underpins our impact cases on vaccination/screening and policing.

3.2 Infrastructure and facilities

During the assessment period, Psychology has made substantial investments to enhance our research infrastructure and facilities. This has included several new lab-based facilities to support

cognitive neuroscience methods, virtual reality, and developmental research. In 2017, the School invested approximately £80K in a new state-of-the-art, air-conditioned, two room electroencephalography (EEG) laboratory with a 72 channel Biosemi active electrode system, washing-up facilities and capability for simultaneous eye-tracking and GSR. These investments have supported the production of strong outputs in cognitive neuroscience journals such as Neuroimage, Psychophysiology, and Journal of Cognitive Neuroscience. In 2014, we acquired SMI eye-tracking glasses for mobile use to complement our existing Eyelink 1000 Plus system which is used for high-precision, fixed-position eye-tracking on scene and face perception (Spotorno, Laurence ESRC grant). The School has also invested in brain stimulation equipment (Magstim TMS and Neuroconn tDCS/tACS) to facilitate study of causal mechanisms of cognition and position us for translational neuroscience going forward. Reduced-rate access to MRI scanning to support projects is available at the Liverpool Magnetic Resonance Imaging Centre through a 2017 agreement. Biopac tools for recording heart rate and other measures support psychophysiological measures across cognitive, social, and forensic research (Stephens, Noor, Andrews ESRC grant). Other specialist devices for light measurement (colorimeter), synchronised audio-visual presentation, response boxes, cold pressor units, amongst others can support a broad range of paradigms.

In 2018-19, the School established a virtual reality laboratory with an HTC Vive Pro eye which supports eye-tracking in virtual environments for more realistic scene perception and social experiments (Spotorno, Stiff). Our observation lab has been remodelled with child-friendly soft furnishings/decorations and equipped for high-definition digital audio and video recordings to support the work of our new developmental/forensic researchers (Andrews, Huang, Kapitany). The School also maintains a suite of other laboratories to support both qualitative and quantitative research. Our Qualitative laboratory has facilities for safe storage, processing, and transcription/coding of digital audio/video data. This supports researchers across the health and wellbeing and social/developmental groups and funded projects with external partners (e.g., Staffordshire Police). Additional facilities include five soundproofed cognition labs with PCs capable of high-speed stimulus presentation and a neuropsychological lab for assessing patients. For data analysis, staff have access to SPSS and Matlab site licenses and high-performance computing facilities in the School of Computing (Brooks, Grange; simulations, computational modelling). Many staff have moved to open-source statistics packages such as R and JASP as part of our commitment to open research.

The unit has access to a variety of participant recruitment mechanisms to support research and has enhanced these over the REF period. In 2018, we expanded our undergraduate research participation time scheme from approximately 400 hours of research participant time to a new total of 3500-4000 hours (~220 hours per FTE). We have strong connections with the Royal Stoke Hospital (for patient-based studies), an older adult panel drawn from the local population, and strong connections with local Schools through the Children and Young People's (CYP) network. The unit's research budget as well as faculty funding (e.g., £10K award for online samples in 2018-19) can support researchers with funding to access demographically diverse online participant populations (e.g., Prolific Academic and other sources) nationally and internationally.

A major restructure of University ethics processes in 2018 has significantly increased the efficiency of ethics processes for researchers using a new risk-based approach, modelled on the ESRC ethics framework. The system mandates initial decisions with 21 days of submission and required revisions have been reduced by 50% using conditional approval mechanisms to deal with minor issues in applications. The School ethics committee comprises a broad range of psychologists and has external membership. It is supported administratively by the School office and University-level Research Governance.

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

Collaborations, Networks, & Partnerships: Research collaborations, networks, and partnerships are supported through funded mechanisms as well as at individual level. A UKIERI-funded (Stott & Khan) international project has established strong connections between Keele and

three universities in India and a visiting researcher position for Khan in the Indian Institute of Technology Delhi (2019). This facilitates intercultural work on health and identity that is central to research in our social and health research groups. A Marie Curie Global fellowship (Edelstyn) with Washington University (St Louis, USA) and Padova (Italy) has established strong links for memory and Parkinson's research. KPAC (Stott) has strong collaborations with LSE, UCL, Sussex, Oxford, and Lund. Senior staff members of the school have been awarded visiting (professorial) research positions at Padova (Edelstyn, 2017) and Coimbra (Rotenberg, 2015).

Other staff have active collaborations with universities in the UK and worldwide which have been facilitated by School conference travel support: Aberdeen, St Andrews, UCL, Oxford, Cambridge, Copenhagen, Northwestern, Ghent, York, Durham, Michigan, Kings College London, Kent, Haifa, Hong Kong University of Science and Technology, Amsterdam, Pontificia Universidad Católica de Chile, Universidad Complutense, Madrid, Queensland, and Milan Catolica, amongst many others. We also have extensive interdisciplinary collaborations (e.g., anthropology, Kapitany; criminology, Stott; law, Andrews; social policy, Huang; linguistics, Kent; computer science, Brooks) resulting in a substantial number of papers in non-psychology and interdisciplinary journals including PLoS Computational Biology, Current Anthropology, Policing and Society, Proceedings of the Royal Society, the BMJ, and Applied Linguistics.

Wider Academic Influence, Recognition, & Contributions: Staff are widely involved in the leadership of international journals including the European Journal of Social Psychology (Noor, incoming Co-Editor-in-Chief, current associate editor), European Neurology (Edelstyn, associate editor), British Journal of Social Psychology (Stott, Khan; associate editors), Journal of Social and Political Psychology and Asian Journal of Social Psychology (Khan, associate editor), Psychology of Music (Lamont, editor-in-chief until 2016), Nature Scientific Reports and Frontiers in Cognition (Grange, associate editor), Applied Cognitive Psychology (Andrews, associate editor). Staff are also members of editorial boards including Social and Personality Psychology Compass (Noor), Journal of Eating Behaviors (Rotenberg), Policing & Society (Stott), International Journal of Behavioral Development (Rotenberg), European Journal of Social Psychology (Khan), Psychopathology (Edelstyn), and BPS Psychologist and Digest (Stephens; Chair Advisory Committee).

Staff are also active in peer reviewing for national and international grant bodies including Parkinson's UK & Italian Ministry for Scientific Research (Edelstyn); ESRC (Rotenberg, Sherman), the British Academy & Deutsch Forschungsgemeinschaft (Noor), Leverhulme Trust (Rotenberg), US National Science Foundation & Belgian FWO (Brooks), amongst others. Staff contribute to peer review at a range of international journals including, for example: PNAS (Grange), Psychological Science (Brooks, Kapitany, Williams), JEP:HPP (Grange, Brooks), Journal of Personality and Social Psychology & Political Psychology (Noor), Journal of Neuroscience (Brooks), Nature Human Behavior (Kapitany), Neuropsychology (Williams), PLOS One (Kapitany, Sherman), Philosophical Transactions of the Royal Society: B (Kapitany), Psycho-Oncology (Sherman), Memory (Williams), Applied Cognitive Psychology, and Behavioral Sciences and the Law (Andrews).

Our staff have also received community recognition for their achievements. Stott was the recipient of two prestigious awards by the ESRC for research impact including its 'Celebrating Impact' First Prize and, in 2015, the ESRC acknowledged Stott's work on policing crowds as one of its 'Top 50' achievements in its 50-year history. Rotenberg was appointed as a Fellow of the British Psychological Society.

Staff also contribute to the wider academic community as elected members of governing boards of national and international professional bodies including the British Psychological Society (Stott, former Trustee & former Social Section Chair; Sherman, Deputy Chair of BPS Research Board; Stephens, Psychobiology Section Chair), British Neuropsychological Society (Edelstyn, President), Experimental Psychology Society (Grange, outgoing committee member; Brooks, incoming), International Society for Political Psychology (Noor, governing council); Asian Association of Social Psychology (Khan, executive committee), Society for Education, Music &

Psychology Research (Lamont, trustee), Society for the Psychological Study of Social Issues (Noor, 2017-2019). Staff have also organised discipline-leading national and international conferences including the European Association of Social Psychology conference (Noor, 2018, San Sebastian); BPS Cognitive Section Conference (Sherman, Barcelona), biannual BNS conferences (Edelstyn), and European Society for the Cognitive Sciences of Music conference (Lamont).

Wider Contributions to Economy & Society: Additionally, to our impact cases, Keele Psychology staff contribute to decision-making processes that influence the functioning of our societies. Our new focus on policing and law is developing wider influence nationally and internationally. Stott currently serves as part of the UK government's Scientific Pandemic Influenza Group on Behaviours (SPI-B) and Chairs its Policing and Security sub-Group which has been extremely active during the 2019-20 COVID-19 pandemic. KPAC has delivered several high-profile professional development events for police and Andrews has provided multiple Continuing Professional Development sessions on best practice interviewing to police and police trainers, social workers, intermediaries, lawyers, and judges in England, Wales and Scotland. She has also contributed to Ministry of Justice Special Interest Groups, informed the implementation of reformed interviewing and training in Scotland, and regularly serves as an expert witness in England, Northern Ireland, and the Republic of Ireland. Internationally, Huang and her team have introduced evidence-based guidelines for child investigative interviewing to Taiwan changing practice and policies. She regularly provides training workshops to child protection practitioners and advises on investigative interviewing policy in Taiwan. She also serves as an advisory council member for the UN anti-torture initiative on the development of International Guidelines on Non-Coercive Interviewing and Associated Safeguards.

Engagement with the Public & Diverse Communities: Staff have strong engagement with public science communication through popular books, media engagement, local events and knowledge co-production. For example, Stephens was awarded the 2017 British Psychological Society Book of the Year Award (Popular Science Category) and the 2014 Wellcome Trust & Guardian Science Writing Prize. June 2015 marked the publication of his popular science book, *Black Sheep: The Hidden Benefits of Being Bad* which has been translated into at least 10 languages. Stephens's swearing research has garnered mainstream media attention with a verified reach of 74 million including 501 UK news articles, and 13 broadcast interviews or mentions including Sky TV, BBC 1 and The Guardian (Keele Media Impact Report). Stephens's 2019 work with Nurofen had a verifiable reach of 84 million people. Noor's 2018 book, *Forgiveness is Really Strange*, has led to media engagements including on BBC World Service Health Check. Broadcast media engagement is facilitated by an on-campus television and radio studio with dedicated ISDN line. Psychology also contributes regularly to Keele's strong relationship with The Conversation to inform public debate with Psychological insights articles from 12 staff and one PhD student). Stott contributes regularly to public discussions of policing and public order through numerous television and radio interviews including being a guest on BBC Radio 4's *The Life Scientific* in June 2020. Stott is also involved in a RCUK Strategic Support to Expedite Embedding Public Engagement with Research (SEE-PER) grant to Keele which supports knowledge co-production with the public. We also engage locally in Staffordshire. Nearly all staff have participated in Stoke Psychology in the Pub and/or Pint of Science events and our Children & Young People's Network has strong relationships with local youth organisations and schools.