Institution: University of Sussex

Unit of Assessment: UoA4, Psychology, Psychiatry and Neuroscience

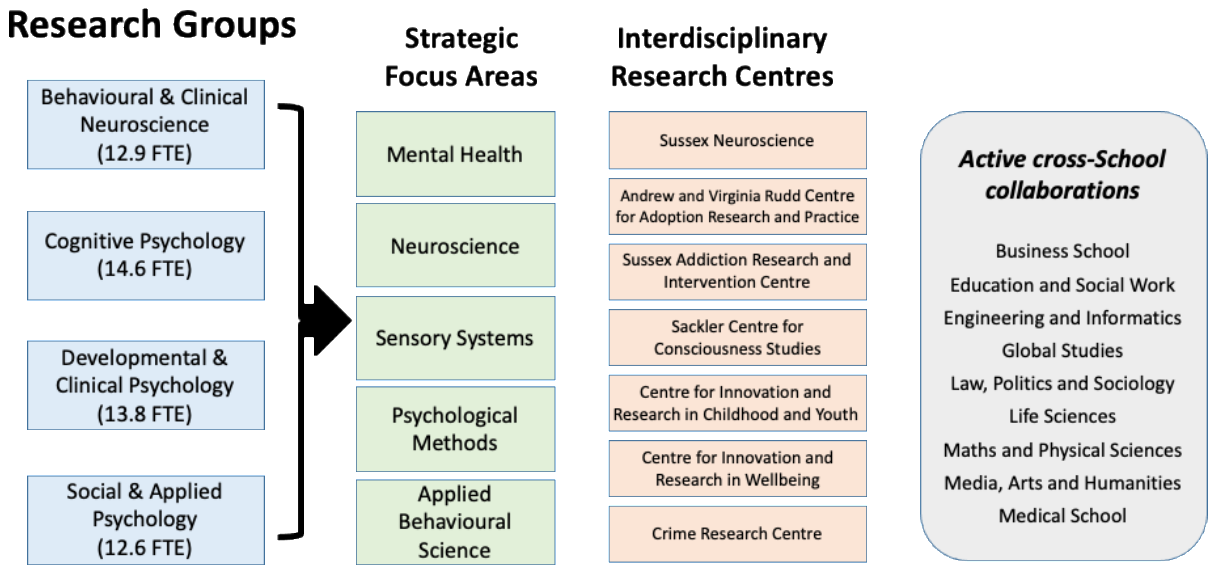
1. Unit context and structure, research and impact strategy

1.1 Overview

We conduct a wide spectrum of discovery-oriented research ranging from fundamental neuroscience to social psychology, combined with strong engagement with practitioners, policy-makers, non-governmental organisations and the private sector. During the review period, we have been awarded £19.9M in new research funding, more than doubling income in the REF2014 period, while faculty have increased from 44.2 to 53.9 FTE. Faculty have published over 1300 peer-reviewed journal articles and received over 40 national and international prizes and eminent recognitions. Sussex's UoA4 research emphasises interdisciplinary collaborations, partnerships and networks at local, national and international levels (detailed in **4**).

Founded as a Department within the School of Life Sciences (2003) through the merger of three distinct Psychology groups (from Biological Science, Cognitive Science and Social Science), Psychology became a financially independent School in 2009. Faculty are organised into four **Research Groups**, and the strength of our work is enhanced and extended through five **Strategic Focus Areas** (henceforth focus areas) that sit between the Research Groups and **interdisciplinary Research Centres** that intersect with other disciplines across Sussex, illustrated in Figure 1.

Figure 1 The structure of Psychology research at University of Sussex



1.2 Research Groups

1.2.1 Behavioural and Clinical Neuroscience

(12.9 FTE, 223 peer-reviewed outputs, 37 PhDs awarded)

This group investigates normal and abnormal neurobiological underpinnings of behaviour, focussing on learning and motivation, with a close translational inter-relationship between pre-clinical and clinical work. We have international excellence in three key areas: Pharmacological and Behavioural Addictions (Badiani, Campbell-Meiklejohn, Crombag, Duka, King, Koya, Merlo, Rae, Singer), Appetite and Obesity (Crombag, Koya, Singer, Yeomans), and Ageing and Dementia (King, Hall, Morcom, Rusted). The group plays a lead role in Sussex Neuroscience, leads our Sussex Addiction Research and Intervention Centre (**SARIC**), and contributes to

the **Sackler Centre for Consciousness Studies** (hereafter Sackler centre) and **Crime Research Centre**. Beyond these contributions, research focusses on fundamental biological influences on behaviour, for example, on how poor interoceptive ability is related to individual differences in negative affect, impulsivity and intentional action (Duka and Rae, in partnership with Critchley/Garfinkel at the **Brighton and Sussex Medical School**, **BSMS**, Neuroscience group). Work is notably inter-disciplinary: for example, Yeomans, working with researchers in food science (Reading) and food chemistry (Quadram Institute), has shown how beliefs about food direct attention to allow more efficient nutrient processing. Work by this group is also impactful: for example, Badiani's discovery that benzydamine, a widely used non-steroidal anti-inflammatory drug, has addictive properties raised concerns about its widespread use.

1.2.2 Cognitive Psychology

(14.6 FTE, 377 peer-reviewed outputs, 42 PhDs awarded)

Our Cognitive group follows four broad themes: Thinking, Memory and Language (Bird, Ormerod, Garnham, Oakhill); Sensation, Perception and Attention (Bosten, Forster, Franklin, Hole, Simner, Sohoglu, Ward); Mammalian Cognition (McComb, Reby); and Cognition and Consciousness (Dienes, Forster, Roseboom, Scott). Members combine modern neuroscientific methods (e.g., to record or modulate brain activity and eye movements) with a wide range of behavioural and self-report measures. Members of the group co-lead **Sussex Neuroscience,** are key partners in the **Sackler Centre** and the **Crime Research Centre**, and have significant cross-School collaborations (e.g., with BSMS).

Strategic recruitment of Ormerod as Head of School (2014) added leadership for our **Applied Behavioural Science** focus area (**1.5.1**). His expertise in interviewing and security has since been adopted by major airlines and the US Federal Bureau of Investigation (**4**). Research into Mammalian Cognition (McComb, Reby) has generated ground-breaking findings on vocal and non-vocal mammalian communication, for example that horses remember emotion in human faces. It also has reach beyond academia: e.g., McComb's 2020 paper on cat-eye narrowing ranked 35th worldwide on Altmetrics. Innovative collaborations (Reby-mammalian communication; Simner-synaesthesia) have sparked novel discoveries such as the first evidence that dogs "see" with their ears. Our evolutionary perspectives on vocal communication integrate with wider work on language (Garnham, Oakhill) which continues to be impactful: building on her REF2014 Impact case study, Oakhill's research on reading difficulties underpinned key changes to the National Curriculum (English Programme (2014), leading to significant change in teacher-training and professional development (see **Impact Case Study**).

1.2.3 Developmental and Clinical Psychology

(13.8 FTE, 342 peer-reviewed outputs, 33 PhDs awarded)

This group examines typical and atypical emotional, social, cognitive and behavioural development across the lifespan. It combines primary research with a policy-and-practice agenda, through strong links with policymakers and practitioners in clinical psychology (particularly Sussex Partnership NHS Foundation Trust: henceforth *Sussex NHS Trust*) and education (government departments through to local authorities and charities). Researchers cluster into three groupings: Development of Cognition and Communication (Horst, Leavens, Yuill), Mental Health through the Lifespan (Cartwright-Hatton, Cavanagh, Fowler, Greenwood, Harold, Meeten, Michelson, Sellers), and Social and Emotional Development (Banerjee, Field, Gaysina, Lester, Pike). Diverse methodologies span laboratory-based experimental studies of behaviour through observational studies in humans and primates to analysis of data from cohort studies to major clinical intervention trials of novel treatments in mental health. This group also led one of our Centres (Andrew and Virginia Rudd Centre for Adoption Research and Practice; hereafter **Sussex Rudd Centre**), and contributes to **Sussex Neuroscience, SARIC** and the **Centre for Innovation and Research in Childhood and Youth (CIRCY**). One key theme concerns fundamental cognitive and social processes in development, using diverse research designs and methodologies in different contexts. For example, Horst's experimental evidence about the power of repetition has been developed into impactful approaches to pre-school

reading, and Banerjee's work has highlighted the significance of kindness in educational and other settings. Analysis of large longitudinal and cross-sectional datasets has informed our understanding of how maternal positivity impacts child adjustment (Pike) and has allowed the exploration of multiple genetic influences on child development (Gaysina, Harold, Sellers, Lester).

1.2.4 Social and Applied Psychology

(12.6 FTE, 301 peer-reviewed outputs, 34 PhDs awarded).

The Social and Applied group combines a theoretical focus with applied relevance, covering three main areas: Group Processes and Intergroup Relations (Brown, Drury, Easterbrook, Vignoles, Long), Identity Processes (Dittmar, Vignoles, Easterbrook) and Health Psychology (Harris, Jessop, Miles, de Visser, Sparks, Farsides). The group contributes to **SARIC** and the **Centre for Innovation and Research in Wellbeing**. The focus on translation of theory to impact is exemplified by Drury's work on our understanding of crowd behaviour during major events (e.g. Hajj in Mecca), and particularly relating to social problems such as riots. His research has fundamentally changed crowd-safety procedures in stadiums and emergency-scenarios (see **Impact Case Study**). Similarly, Vignoles' empirical and theoretical advances in group identity helped elite teams, including 2016 Olympic Gold-medal winners, businesses and military leadership, achieve success (see **Impact Case Study**), and Dittmar's analysis of social drivers of body-shape dissatisfaction, exemplified through her work on Barbie dolls, contributed to changes in toy manufacturing. The group also continue our long tradition of excellence in cross-cultural studies, leading substantial cross-cultural international networks (**4.2**). Finally, our Self-Affirmation lab (Easterbrook, Harris, Jessop, Miles and Sparks) has pioneered an understanding of self-affirmation interventions that can induce behaviour changes in a remarkable spread of domains (e.g., educational attainment, exercise, healthy eating, smoking/alcohol reduction and altered carbon footprints).

1.3 Strategic Focus Areas

Our five focus areas bring together expertise from across our Research Groups: the three described here address major challenges in the science of the mind, while the others focus on how we undertake our research and translate it into practice **(1.5)**.

1.3.1 Mental Health

Our mental health focus has a diverse array of strengths, closely aligned to UKRI and NIHR strategic priorities, and spanning all four Research Groups. Research excellence traverses the lifespan from child anxiety and youth mental health through to common and severe mental health problems in adulthood, parenthood, and older age (mood, anxiety, psychosis, hearing-voices, substance use). Our strengths in Mental Health were enhanced by two key strategic developments: establishment of the Rudd Centre (**1.4**), and strategic appointments (**2.3:** Fowler and Greenwood). Those appointments enabled us to take lead roles in cutting-edge large-scale therapeutic trials, many funded by NIHR, and we have consequently made key contributions to trials in areas as diverse as psychosis, sleep and the therapeutic use of cannabis. These trials develop from extensive primary research into novel treatment approaches with strengths in novel digital therapies, particularly in relation to mindfulness (Cavanagh, Banerjee), anxiety (Cartwright-Hatton) and stress management (Greenwood). Our strengths in child and adolescent health are further evidenced by Harold and Sellers' influential research within the **Rudd Centre** which underpinned a 2017 government policy highlighting the role of family processes in child mental health. Banerjee's research on children's peer relationships is used by teachers in hundreds of schools, as well as influencing national policies that now place socio-emotional functioning and wellbeing as central priorities within schools (see **Impact Case Study**). Our global impact is evidenced by numerous interventions aimed at developing countries. For example, Michelson's novel problem-solving intervention has enhanced adolescent mental health in low-income schools in India.

1.3.2 Neuroscience

Work in this focus area encompasses extensive contributions to the **Sussex Neuroscience** centre **(1.4).** Fundamental neuroscience research, funded by BBSRC and MRC, includes Hall's focus on vascular blood-flow regulation has altered how we interpret human neuroimaging, and elucidated which features of altered capillary-level blood flow increase risks of stroke and memory loss. Koya's state-of-the-art techniques to identify neuronal ensembles, has revealed that appetitive associations modulate activation of neuronal ensembles in the nucleus accumbens but not the orbitofrontal cortex, fundamentally changing theories of addiction and ingestion. Understanding of addiction has also advanced through Badiani's work on environmental specificity, and by Singer showing how individual differences in associative learning (sign- versus goal-tracking) predict susceptibility to addiction. Our human imaging studies elucidate basic neuronal processes involved in many aspects of cognition and consciousness. For example, Bird, funded by two ERC awards, identified how theta-band oscillations generated by the human hippocampus encode information about upcoming movement paths, clarifying the precise nature of neuronal signalling in navigation. Likewise, using an inhibitory response task, Rae has elucidated the extra neural processing used by Tourette's patients to try to suppress involuntary actions. We adopt an interdisciplinary approach to understand the neuroscience of ageing. Notable findings include Rusted's elucidation of APOE genotypes in brain function across the adult lifespan where brain pathology is absent. Similarly, Morcom's analysis of increased prefrontal use with ageing clarified that this is not a compensatory response to memory loss as was widely believed.

1.3.3 Sensory Systems

Faculty in Sensory Systems conduct ground-breaking research on vision (Franklin, Bosten and Roseboom), audition (Reby, Sohoglu), taste/smell (Yeomans, Forster), touch (Ward), sensory attention (Forster), sensory substitution and synaesthesia (Ward, Simner), and multi-sensory integration (collaboratively). For example, Franklin's two major ERC-funded programmes have demonstrated how colour vision develops from infancy via interactions with the environment. Using infants' gaze-responses she has also shown that colour categorisation is biologically constrained rather than being pure cultural constructs. This work is also impactful, leading to commercialisation of tests of colour vision deficiency, and consultancies with paint and baby equipment manufacturers. Simner and Ward make Sussex the premier synaesthesia research laboratory worldwide and lead the discipline in both adult and child research. For example Simner's major ERC-funded programs have charted the development of synaesthesia in young children, impacting on their schooling and well-being.

1.4 Interdisciplinary Research Centres

The School is a significant contributor to 7 interdisciplinary Research Centres. Foremost is **Sussex Neuroscience**, formalised as a University Strategic Research Programme in 2013, with Ward as co-director. Neuroscience has been a key interdisciplinary focus at Sussex since the 1970s and straddles four Schools (Psychology, Life Sciences, Engineering and Informatics, BSMS). Nearly one third of Psychology research faculty are members of Sussex Neuroscience, spanning three Research Groups. It is supported from 2013-2022 with £3.3M from the University Strategic Development Fund to cement an internationally-recognised programme of excellence. A new financial model (from 2018), with contributions from partner Schools, enables further growth and stability. Direct financial support underpins core activities, including a world-leading 4-year PhD programme, investment in specialist technicians, facilities and equipment (e.g., MRI-compatible virtual reality), and a weekly invited speaker series.

The **Rudd Centre** is one of only two interdisciplinary research centres worldwide that focusses on children, parents and families in an adoption context. Founded in 2014, it was upgraded to one of 10 University-level Research Centres (2016), reflecting its multi-disciplinary nature (Psychology, BSMS, and the School of Education and Social Work). Psychology provided support through a second faculty member (Gaysina 2013- £70Kpa), an administrator

(£30Kpa), plus matched-funding for an ESRC Future Leaders fellow (Sellers 2016-2019, subsequently joining BSMS as lecturer). The Rudd Centre achieved tangible impact, shaping changes in UK policy on adoption, including a new generation of family-focused support and practitioner-training provided by local authorities. Following Harold's departure to Cambridge (2020), Rudd Centre members have realigned along adoption-related workstreams.

Psychology leads **SARIC**, a Centre founded on Sussex's excellence in addiction research, focussed on enhancing our understanding of the biopsychosocial underpinnings of addiction and translating this into rational therapies for its treatment. This Centre supports multiple research streams including de Visser's influential research on limiting alcohol consumption, which is having considerable and sustained impact by underpinning Dry January initiatives (see **Impact Case Study**). This builds on Duka's extensive work exploring human responses to alcohol, where she has uncovered how individual differences in impulsive behaviours and emotional-processing can impact alcohol consumption, and how unique patterns of brain activity regulate these processes.

The School is a partner in the **Sackler Centre** (founded in 2010, led by Informatics and BSMS). Dienes, Roseboom, Scott and Ward are key contributors, further elucidating models of conscious and unconscious learning, and individual differences in perception. Our partnership with the Sackler Centre enhances our ability to secure external funding, including a significant Leverhulme doctoral training program (DTP; **2.4.2**).

Banerjee leads the research theme of 'Emotional Lives' in the interdisciplinary **Centre for Innovation and Research in Childhood and Youth**, with a focus on policy and practice relating to the emotional health and wellbeing of children and young people, incorporating wider research in Psychology (e.g., play experience, Lester). Crombag co-directs the **Crime Research Centre**, housed in the School of Law, Politics and Sociology, which by focussing on crime associated with drug use and addiction is impacting policy change **(1.5.1).** Likewise, Brown was a co-director and major contributor to the **Centre for Innovation and Research in Wellbeing** (until his retirement in 2019), focussing on cultural influences on wellbeing.

1.5 Support for Research with Impact

Strategic reviews (2016/2019) recognised increased need for School-wide structures to facilitate sustained growth, improve funding, and enhance research with impact. Below we detail the strategic structures that underpin our increased research success.

1.5.1 Strategic underpinning for Impact and Knowledge Exchange

Our success in **impact and knowledge exchange** has arisen from a calculated strategy to promote these activities through workload allocation, financial backing, and dedicated support structures. In 2018, we founded our **Applied Behavioural Science** focus area, led by Ormerod, to draw upon expertise across all Research Groups and to provide an interface with outside partners. Its accessible website advertises our capacities in relation to consultancy, public engagement, and collaborative and applied research, in areas such as recruitment training, safety design, education, crowd management, wellbeing and health. This enables faculty to develop external links and compete for contracts with larger agencies. To further enhance an income stream through consultancy and evaluation contracts, we have strategically invested in administrative personnel and committed to a three-year development strategy funded from our Higher Education Innovation Fund (HEIF) budget (£40Kpa).

Other structures to support impact activities include annual **Personal Research Planning (PRP)** reviews, where routes to impact are identified, nurtured, and captured in our workload model. Psychology was one of the first Sussex Schools to introduce a faculty Impact Champion role (2014), which developed into a Deputy Director of Research role (2016-), working alongside the University Research Quality and Impact team to foster a culture that understands and values impact.

The School also benefits from the Higher Education Innovation Fund (HEIF), with our £25Kpa allocation purposed as a School Impact Fund. This supports internally-reviewed impact and

knowledge exchange applications, two notable awards being made to:

a) Oakhill to contribute to a workshop in South Africa, which resulted in a successful British Academy grant on how story-based activities affect literacy in South African pre-schools (£265K);
b) Crombag to host a stakeholder event with SARIC/School of Law, which explored addiction within legal policy. This led to a British Academy Knowledge Frontiers Award (£40K), collaborating with Law Reform Commissions from New South Wales, Hong Kong and New Jersey.

Our focus on impact mirrors University-wide strategy, where impact innovation is rewarded in an annual Impact Day (2015 onwards). Psychology faculty and Early Career Researchers (ECRs) received six Sussex Impact awards, as well as 13 funded projects from the University-level ESRC Impact Accelerator Account Fast Track Impact scheme, and two from our Social Science Impact Fund (totalling £61K). These awards led to tangible impact (e.g., Cartwright-Hatton's 2019 establishment of the UK's first NHS clinic to prevent family transmission of anxiety).

1.5.2 Promoting Open Access and Open Science

A worldwide disciplinary challenge is in replication of key findings. The School has risen to this challenge by designating **Psychological Methods** as our fifth focus area. Led by Field (founder of the Royal Statistical Society special interest group for Teaching Statistics), with oversight from Dienes (Deputy Director of Research for Outputs), we have been at the leading edge of best practice in study design, open science, and statistical practice. Field has been a leader in statistical literacy through his award-winning textbooks (e.g., his classic SPSS textbook has over 67K citations) and Dienes's promotion of Bayesian statistics to enhance interpretation of results is exemplified by influential papers in *Frontiers of Psychology* (1224 citations) and *Nature Human Behaviour* (701 citations). His notable work establishing Peer Community in Registered Reports is free to authors, readers, and institutions, where journals (e.g., Cortex, RSOS, many others) guarantee acceptance of pre-registered papers, giving power to authors. The School's commitment to open science also includes:

- Changing statistics teaching from SPSS to R/Rstudio. Taught Master's programmes became R-based from 2018, and undergraduate courses from 2019. These changes equip future researchers with statistical capabilities to achieve open and replicable science, while providing transferable skills in coding/programming;
- Investment in three specialist education-focused lecturer posts (2019-; £190Kpa) to boost methods education and provide staff development from 2020 to ensure all research faculty become competent in R, with planned completion in 2022;
- Encouraging faculty and PGR to publish research data in Open Access repositories or the University data repository;
- School-wide dissemination of best practice, with at least one colloquium per term addressing Open Science from key Open Science figures;
- An Open Science seminar group, formed as an initiative by our doctoral students;
- Forthcoming establishment of a City Lab, a participant recruitment and testing site, in central Brighton, to widen research participation and sample representativeness.

1.5.3 Improving success in capturing external research funding

Early in 2016, we recognised that growth targets for research funding were not being met. We made a number of structural changes that subsequently more than doubled our REF2014 income (detailed in **3.1**). Our first step was to recognise changes to the wider funding landscape, and to respond by designating strategic focus areas. We also introduced changes to maximise funding application quality, including:

- Enhancements to our academic oversight of funding proposals:
  - A new Deputy Director of Research for Funding provides oversight and grant-mentoring support;

- Critical Friends from senior faculty support proposal preparation and alignment to funder strategic priorities;
- Major proposals receive additional internal review with responses required before submission;
- Rigorous mock interviews for shortlisted applicants (e.g., ERC);
- Research Awaydays dedicated to grant writing, submission protocols etc.

- New PRP reviews for research faculty, to discuss targeted funding applications, workload management, resource requirements, and grant-writing skills (**2.3**)

Recognising that competitive funding applications benefit from pilot data, we also strategically invested internal funding. As well as the School Research Fund for small pump-priming, we had 13 successful bids to the University Research Development Fund (RDF) leading to £6.6M in new grant applications. For example, a £28K RDF for Hall (2018) allowed for key pilot data pivotal to her successful (2019) MRC grant exploring altered blood supply in Alzheimer's disease (£634K).

1.5.4 Management and oversight of research strategy

Our research strategy is aligned with Sussex's institutional strategic plan, most recently expressed as a core goal to generate *Research with Impact* within the Sussex 2025 Strategic Framework (described in our Institutional Environment Statement). At School level, strategic developments in research are overseen by the Head of School and Director of Research and Knowledge Exchange (**DRaKE**), with support for doctoral students led by the Director of Doctoral Studies (**DoDS)**. From 2016, we created three **Deputy Directors of Research**, to better focus strategic development for Outputs, Funding, and Impact & Knowledge Exchange. **Research Group Leads** play a crucial role in identifying areas for development, working dynamically with **Focus Area Leads**. Termly DRaKE-led Research Committee meetings provide a forum to plan and discuss research developments that feed into termly School Strategy Committee meetings. Cumulatively, this ensures our research agenda is tailored to current and future challenges, even beyond our basic research agenda – as evidenced by our responses to climate change (**3.2**) and the Covid-19 pandemic (**4.4**).

We review and assess the quality of our research in line with the principles expressed in the San Francisco Declaration of Research Assessment (DORA), to which Sussex was one of the first UK university signatories. The School is also committed to the highest standards in ethics and research governance and has taken the lead within University governance and ethics review, working closely with the Research Governance Office. The University's S*cience and Technology Cross-Schools Research Ethics Committee* oversees all science-based human experimental research and has been chaired by Psychology faculty throughout this period (currently by Long).

1.6. Future Strategic Aims and Goals

Our research strategy is articulated in our School strategic plan, *Sussex Psychology 2025: Psychology for a Better World*. Priorities include:

1.6.1. Strategically investing in new faculty

Through succession planning and strategic faculty appointments, we will consolidate existing areas of excellence including intergroup relations, language, appetite, and addiction, as well as targeted investments in new directions of research for focus areas and Research Centres. Key aspirations include further expansion of expertise in child and adolescent mental health, clinical and translational neuroscience, and magnetoencephalography (MEG). Additionally, we will partner in a new Data Intensive Science Centre, building on our Psychological Methods focus area, and will consolidate emerging interdisciplinary strengths across social, developmental, and clinical areas by establishing a new Sussex Kindness Research Centre.

1.6.2. Proactively mentoring Early Career Researchers (ECRs) and doctoral students

We will further strengthen systems to mentor ECRs, prioritise fellowship applications for future leaders, and foster a collaborative and mutually supportive research environment. We aspire to achieve a ratio of two doctoral students per research faculty FTE (currently 1.6), particularly by targeting expansion of our matched-funding model (**2.4**).

1.6.3. Developing external engagement and applying psychological science to policy and practice

We will further develop our **Applied Behavioural Science** focus area as a vehicle for industrial engagement, new partnerships outside academia, and income generation (consultancy, HEIF). Future initiatives include business manager support, the City Lab for engaging directly with the public, and pump-priming for prototypes and interventions. We will develop translational collaborations with industrial partners and healthcare providers (e.g., Sussex NHS Trust).

1.6.4. Developing and renewing research space and technical services to provide a state-of-the-art infrastructure for long-term growth

We will continue to develop and upgrade the human neuroscience infrastructure we share efficiently with other Schools (e.g., EEG and imaging facilities), including specific investment to extend work using magnetoencephalography (MEG) techniques. We will also redevelop and expand our technical support, shared across labs and Research Groups. This will include: building an advanced IT capacity for online testing and for analysing big data; digital assessment of sensory processing; and technical support for research using NHS datasets (e.g. CRIS-UK) as part of our strategic focus on digital mental health.

1.6.5. Facilitating interdisciplinary collaborations

We will prioritise a School Research Fund to enable faculty to develop further local, national, and international collaborative networks that enhance our reputation for interdisciplinary research. We will consolidate existing cross-School Centres and extend external collaborations with academic institutions and R&D departments (e.g., Sussex NHS Trust, NHS England, Public Health England, Early Intervention Foundation, and industry partners in food and pharmaceuticals).

1.6.6. Consolidating and extending our profile in open science practices and methods

Our focus area on **Psychological Methods** will strengthen all Research Groups, developing our excellence in quantitative and qualitative research methods as a model for other researchers internationally. We will develop a comprehensive policy to encourage Open Science principles, including support and training for pre-registration and open-access software (e.g., R). We will foster researchers' involvement in 'many labs' networks, including through our membership of the South East of England Replication in Psychology Syndicate (SERPS), and incentivise team-based collaborative grants.

1.6.7. Responding further to the Climate Emergency

We will lead cross-School collaborations, particularly with the Sussex Sustainability Research Programme and ecologists in Life Sciences, to amplify psychological perspectives in interdisciplinary environmental research, for which Sussex is known internationally. We aim to reduce our own environmental footprint through policies on transport and reduced energy consumption of our labs and estate.

2. People

A core facet of our research strategy is to foster an environment that enables research faculty

to realise their potential as internationally-recognised researchers. All faculty on teaching and research contracts (research faculty) have **40% of their time protected** for research, plus **10% for doctoral supervision**. Support for funding applications, incentives to *seek* funding, and the introduction of annual PRP reviews, further underpin that goal. Student intakes more than doubled between 2015 and 2020, a carefully managed strategic decision to enable additional faculty recruitment, including some on a new education-focused career pathway to focus on pedagogical innovations for our large student cohorts. This allowed us to increase support for faculty research throughout this rapid growth.

2.1 Staffing policy

We maintain the policy detailed in our REF2014 submission of recruiting junior staff to underpin long-term sustainability in Research Groups and focus areas. Of 20 new research appointments made since January 2014, 13 had not previously held permanent faculty positions (and 11 were ECR). Alongside this, recruitment of senior staff has responded to specific strategic priorities and opportunities.

2.2 Changes in research personnel

Key strategic appointments of research faculty built on areas of growth or strength across Research Groups and focus areas. We made 21 new appointments, offsetting three faculty retirements (Davey, Morgan, Brown) and nine who moved elsewhere (Khurana, Nijhawan, Ripley, 2014; Kanai, 2015: Oliver, 2017: St Jacques, Dyson, 2018; Reby, Harold, 2020), increasing the School from 49 (44.2 FTE) to 58 (53.9 FTE) research faculty.

We made 5 key appointments in our Developmental and Clinical Group, to enhance our Mental Health focus area:

- Fowler (2013), an international leader in the design and conduct of multi-centre intervention trials of psychological therapeutic methods, particularly in early psychosis;
- Michelson (ECR: 2018), who researches mental health care for disadvantaged youth and families, and whose extensive links in the developing world aligned us with the Global Challenges Research Fund;
- Gaysina (ECR: 2013) and Lester (ECR: 2015) to enhance our focus on the analysis of genetic influences in large data cohorts;
- Meeten (ECR: 2018) to complement Field's research on anxiety, strengthening this area following Davey's retirement;
- Greenwood (2018) to a Chair (0.5FTE) and lead contact with Sussex NHS Trust (she previously held an honorary position in Psychology).

We made 6 key appointments to our Behavioural and Clinical Neuroscience Research Group, to enhance our Neuroscience focus area:

- Hall (ECR: 2014) to expand fundamental neuroscience through her ground-breaking work on neural blood-flow;
- Campbell-Meiklejohn (2015) to extend our expertise in the neuroscience of reward to encompass social reward;
- Morcom (2019) to further underpin human research on the neural basis of age-related memory impairment;
- Rae (ECR, 2019) to strengthen links with BSMS and add neural network modelling of voluntary action in Tourette's;
- Merlo (2019) to strengthen research on fundamental neuroscience of learning and memory;
- Singer (ECR: 2019) to strengthen our fundamental research on addiction and motivation.

Our Sensory Systems focus area was further strengthened by 4 new appointments to our Cognitive Psychology Group:

- Simner (2014) to establish with Ward our unique international strengths in synaesthesia;
- Bosten (ECR, 2015) to strengthen our expertise in human vision;
- Sohoglu (ECR, 2019), whose work in auditory neuroscience reinvigorates an historical

strength for Sussex Psychology;
- Roseboom (ECR, 2020), a joint-appointment with Informatics, whose work on sensory and temporal perception further underpins our collaborations within the Sackler Centre.

Research by our Cognitive Psychology Group was broadened by appointment of Ormerod (2014: **1.3**), and work in memory and perception enhanced by the appointments of Dyson and St Jacques (2015), although they subsequently returned to Canada for personal reasons. Finally, our Social and Applied group was further strengthened by the appointments of Easterbrook (ECR: 2014) to strengthen work on group processes and social identity and Hurst (2019), whose interests in body image and cultural values complement Dittmar.

Looking ahead, five new research faculty (in the areas of intergroup relations, social development, and organisational psychology) have joined since August 2020, offsetting a further five retirements after July 2020. In addition, our budget provides for 5 further research faculty appointments in 2021.

We also strengthened technical support for research in 2018 by appointing:

- a senior technician with skills in sensory psychophysics and experimental tools development to support our **Sensory Systems** focus area;
- a bioengineer in neuroscience developing *in vivo* optical imaging and a technician in cognitive neuroscience to support human connectomics as part of our contribution to **Sussex Neuroscience**.

We also enhanced professional services for research by appointing a Research Support Coordinator (2016) to support our Open Access policy and colloquia series, and a clerical post (0.2FTE: 2018) to maintain databases on outputs, knowledge exchange and impact.

2.3 Staff development, review and promotion

Individual research performance is overseen through annual PRP meetings, led by the DRaKE team, Head of School and Research Group leads. Meetings review research achievements (outputs, funding applications, impact and knowledge exchange) and develop plans to enhance profiles for each faculty member, noting strategic needs that could enhance performance. Staff are guided to specific University-level training from Human Resources (e.g., project management; team leadership). PRP outcomes are scrutinised by the DRaKE and fed into the strategic review process **(1.5.4),** highlighting any needs for investment, training, or guidance. PRP and annual appraisal reviews feed into University-level decisions on promotions. In addition, new and junior faculty have an individual mentor drawn from the senior research faculty in their Research Group. We have fostered a community in which staff are keen to volunteer for these posts, with a willingness to share skills and expertise, to help mentees achieve their potential.

2.4 Training and mentoring our Early Career Researchers and Doctoral Students

A key strategic aim is to develop future research stars, in line with clear commitments within the Sussex 2025 Strategic Framework to support ECRs. An established Doctoral School oversees University-level support for ECR and doctoral students. The Doctoral School's Principles of Doctoral Education set out nine guiding principles to underpin all aspects of doctoral development, embedding transferable and career-focussed skills while celebrating the quality and impact of doctoral and postdoctoral research. We work closely with the Doctoral School, and helped develop their training and University-level Principles, aligned with DORA principles for assessing quality.

2.4.1 School-specific support for post-doctoral ECRs

In addition to 49 grant-linked postdoctoral positions, the School has hosted 5 independent research fellows during the review period: an ESRC Future Research Leader Fellow (Sellers), 2 Marie-Curie fellows (Pisanski, Abu-Rayya), a Daphne Jackson fellow (Bates) and an Alzheimer's Society fellow (Lancaster).

Recognising the key contribution of postdoctoral researchers to our research profile, we created a new faculty administrative role (2015-) to develop their training and mentoring. The performance and training needs of our postdoctoral ECRs are reviewed at annual supervisor-led appraisals, and they are strongly encouraged to undertake Doctoral School training courses. Postdoctoral ECRs have elected representatives at School and Research Committee meetings, and attend our Research Awaydays, where we include sessions specifically for their needs. We have funded dedicated ECR events to showcase their research to wider audiences. These included a well-attended externally-focussed half-day special symposium "Psyched with US" (2018), and our ECRs also showcase their research through public lectures and community events (e.g., Nerd Nite).

2.4.2. Training and Supervision of doctoral students.

We have sustained a thriving community of around 100 doctoral students throughout this REF period. Students are selected from a competitive field of over 100 applicants per annum, with additional candidates for Sussex Neuroscience and Leverhulme programmes. A total of 146 students successfully completed a PhD, 97% submitting within the 4-year maximum registration period (100% from 2017 onwards).

All doctoral students are allocated a main and sometimes a secondary supervisor from faculty in their research area. Our doctoral students benefit from an unusually fertile landscape of training and supervision. They receive discipline-specific training not only from their supervisor(s), **Research Groups** and School, but also from our Centres (e.g., **Sussex Neuroscience**), **ESRC and BBSRC Doctoral Training Partnerships**, and our **Leverhulme Doctoral Scholarship Programme** (for students studying sensation, perception, consciousness). They receive a further layer of broad-based training in research skills and professional development through the University-wide Doctoral School. Our emphasis on skills training and professional development is embedded from year one, and students complete an annual Training Needs Analysis to develop their current and desired skills, delivered through Doctoral School workshops.

For School-level training, we offer M-level modules in advanced methods (e.g., R, Structural Equation Modelling, Advanced fMRI, Multi-Level Modelling, Meta-analysis), with an increased emphasis in the principles and practice of Open Science. The School also offers a range of workshops during a dedicated annual Awayday (e.g., Getting Published; Grant-Writing). Students funded through Sussex Neuroscience also get additional training through three 12-week laboratory rotations from the 40 associated faculty. Recognising the changing research landscape, we have increased professional development, for example, Awayday sessions on translating PhD skills to the real world. Students part-funded by industry spend some of their time working at their industrial partner's centre, as do students without industry funding through a HEIF-funded Doctoral School scheme (e.g., McCrickerd, 2014, 3-month placement at Leatherhead Food Research; Morris, 2018, 3-month placement at Campden BRI). Likewise, students are encouraged to apply for externally funded training and experience to enhance their employability (e.g., Dunn's placement at Public Health England, funded by the RCUK policy internship scheme).

Student progress is monitored by an independent Assessor who assumes 10% responsibility in supervision, providing an annual review of a piece of written work, with independent statements from the supervisor and student. The Assessor acts as a critical friend, ensuring robust supervision and that student needs are fully met. Sussex also runs a Researcher Mentoring Programme where post-doctoral ECRs act as mentors to doctoral students. Our doctoral students' research is showcased at a dedicated poster-day (Year 1), and oral presentation Research Day (Year 2), enabling further advice and feedback from faculty, ECRs and fellow students. The impact of this training is evidenced by prizes at external conferences (e.g., Hughes, 2016, best talk Moyra Sonley Prize at the International Meeting of the UK Synaesthesia Association; Carrasco, 2018, Outstanding Early Career Paper Award, Comparative and International Education Society annual conference; Parkhouse, 2019, best student paper at the European Association of Law and Psychology annual conference, Leuven).

One measure of our doctoral students' success is their contribution to research outputs: 347 of our publications, and 35 of the 126 outputs submitted for REF2021, had one or more PGR as lead or co-author. Employment statistics offer further evidence of success: 62% of our doctoral graduates' first destination was academic teaching or research, 18% in the private sector, and 20% other graduate employment destinations.

To support our students and their training and supervision, we have secured funding from multiple sources, with major external funding through:

- ESRC, firstly through a Sussex Doctoral Training Centre (2011-2016), and then the South East Network for Social Sciences Doctoral Training Partnership (2017+).
- BBSRC, through dedicated and CASE studentships 2013-2016, and through SoCoBio Doctoral Training Partnership (2019-)
- An Alzheimer's Society Doctoral Training Centre (2017-, 8 studentships over 4 years)
- Leverhulme Doctoral Scholarship Programme in Sensation and Perception to Awareness (2018-, 21 studentships, and three one-year postdoctoral fellowships), a Psychology-led interdisciplinary programme integrating psychology, human-computer interaction, neurobiology and computational neuroscience.

Ten of our ESRC studentships have benefited from co-funding by external partners (Headspace; Centre for Team Excellence; Sussex NHS Trust), and we held three BBSRC-Case awards. We have also been awarded fully-funded doctoral studentships: 4-year awards from Mental Health Research UK and Fonds Baillet Latour, and 3-year awards from Health Protection Agency, Public Health England and the Ministry of Defence.

We also have directly funded an average of nine Doctoral Training Scholarships per annum, and also (2014-ongoing) match-funded external contributions of £30K+ to secure 21 additional studentships, attracting a variety of third-stream partners (e.g., Our Future City, Cossatto, Fire Trust). The success of our match-funding scheme led the university Doctoral School to introduce a University-wide scheme, which in turn funded additional Psychology studentships (e.g., World Sugar Research Organisation; Drinkaware). We also regularly welcome students on overseas government scholarships (2-3 per annum), including from Brazil, Chile, Saudi Arabia, Turkey, and Mexico.

2.5 Equality and Diversity

We established an Equality, Diversity and Inclusion (EDI) committee (2014) and have made EDI a central pillar of School decisions. Our EDI strategy is evidence-based, from wider literature and School-wide research (e.g., our social and developmental research into sexual identities: Dittmar, De Visser). The EDI committee works to monitor and promote equality and inclusion for all staff and students, irrespective of their diverse backgrounds and characteristics (including those protected under the Equality Act 2010), and to highlight and celebrate diversity of our School community. EDI Co-Chairs (one female, one male) sit on Strategy and School Committees, ensuring that diversity considerations are core to strategic planning.

Our Inclusive Culture Survey is completed by staff and students in the School approximately every two years, exploring experiences of working/studying in the School as a function of gender, ethnicity, nationality, religion, age, pregnancy and parenthood, marital status, caring responsibilities, sexuality, disabilities, socio-economic background, and working hours. Results are presented at School Meetings and Awaydays, and have recently been used to inform our Athena SWAN Action Plan, as well as new initiatives to promote cultural inclusivity in our teaching

During this REF period we received an **Athena SWAN Silver Award** for gender equality (2020), having successfully implemented the action plan detailed in our earlier (2016) Athena SWAN Bronze Award. We have gender balance in all research management, including the DRaKE team and Research Group Leads, and in recent appointments. We have enhanced our support for the development for early career academics (**2.4**), whom Athena SWAN self-assessments highlighted as frequently female, intersecting with other minorities. Within this we have included financial support for post-doctoral ECRs on fixed-term contracts wherever funders did not meet maternity pay (benefitting 5 ECRs since 2014), and we introduced a 25%

reduction in teaching and administration for the first year after parental leave to allow faculty to prioritise research. We also strategically encourage female research staff to seek promotion earlier in their career, and soon after periods of maternity leave (addressing a sector-wide dominance of male staff at higher levels). Success is evidenced by an increase in the proportion of female professors from 30% (2014) to 41% (2019). Added to this has been increased access to flexible working including a 5-in-7-day working for all research staff when requested. Finally, as part of our commitments to EDI in research policy documentation, we now systematically promote (2020-) non-biased language (e.g., avoiding binary requests for gender in study participants).

Like many UK departments, our faculty profile shows limited ethnic diversity, with just 5% BAME. However, the research productivity of existing BAME staff indicates that they are well supported to achieve research success: e.g., our BAME faculty average £639K of current funding, compared to £304K for non-BAME faculty submitted to REF. They have also held senior administrative roles, and notably Banerjee is currently Head of School (2019-) and leads one of our Impact Case Studies. We are actively working to increase diversity, and successfully lobbied the University for changes to the standard wording of job adverts in order to promote diversity. This was successful, with 3/5 of our most recent appointments from underrepresented groups.

We have also ensured EDI oversight in preparation of our REF submission, ensuring gender balance in our output review panel, and engaged an external reviewing panel with female (2) and male (4) assessors. Just as 48% of our REF-eligible staff are female, 48% of the papers selected for external review were led by female authors, and we ultimately included 48% with female leads in our REF submission.

3. Income, infrastructure and facilities

3.1 Research funding overview

During the review period, the School received £19.9M in new research funding, more than double the income reported for REF2014, and increased per capita funding from £43K (end of REF2014) to £78K (average of final 3 years of REF2021). This success includes £5.2M from UK Research councils (BBSRC, MRC, ESRC, EPSRC, NERC), £5.9M from the European Commission (ERC and Horizon 2020), £2.9M from major UK charitable trusts (Wellcome Trust, Leverhulme), and £2.7M from UK Government, including NIHR, alongside industrial partners and other charities (e.g., the Kavli Foundation). We also secured £2.1M from philanthropic donors during this REF period (Rudd Foundation, REAM Foundation), as well as £268K in consultancies. Especially following the launch of our **Applied Behavioural Science** focus area, consultancies have been improving year-on-year, with four times as many awarded to faculty in 2020 in comparison with 2014.

A major contributor to our research funding has been an increase in ERC awards. The REF2014 review period saw only two ERC awards, compared to five within the current period. The first was MULTISENSE (£1M; 2014-2019) for Simner's research on synaesthesia, the largest sum ever awarded in her discipline. Her strategic appointment in 2014 led to a significant award in sensory hearing (£400k, 2019 REAM) followed by a second ERC award SYNTOOLKIT (£133K, 2019-2021), seeking to take her childhood synaesthesia diagnostic from proof-of-concept into schools and clinics world-wide. Franklin built on her ERC Starter award CATEGORIES (£1.05M; 2012-2018, on the origin of colour categories in language and thought) with both an ERC follow-on award (COLOURSPOT 2016; £110K) and an ERC Consolidator Grant COLOURMIND (with Bosten and Bird; £1.79M). This latter explores how cross-cultural environments influence colour-categorisation in early development. Likewise, building on his ERC starter award (TRANSMEM, 2013-2018; £0.98M), Bird secured an ERC consolidator award (EVENT; £1.7M, 2018-) which explores at behavioural and neural levels how the bombardment of continuous experiences is segmented into discrete events we remember later. The award in July 2020 of an ERC Starter grant to Bosten (COLOURCODE: The Mind's Eye: Decoding Colour Experience"; £1.18M) demonstrates continued success. We also received £231k through the EU Horizon 2020 scheme, for Duka's role in the multinational

project "SyBil-AA - Systems Biology of Alcohol Addiction." We believe our success in ERC funding lies in our new multi-layered protocols designed to improve the quality of our applications (**1.5.3**)

We have successfully diversified research income, with 163 new awards from 72 different funders (cf 117 awards from 47 funders for REF2014). UKRI remain a key funding source, with 45 new awards from UK research councils where Sussex was PI or CoI, generating £2.3M from ESRC, £1.5M from MRC and £1.1M from BBSRC. For brevity, we list key Sussex-only and Sussex-led projects:

- £310K (BBSRC, 2014, Rusted) on neural overactivation in young adult APOE-e4 carriers;
- £159K (ESRC, 2015, Harold) on family inter-relationships and mental health in adoption;
- £445K (BBSRC, 2015, Koya) to identify neuronal bundles underlying associative learning;
- £730K total award (£209K at Sussex; ESRC, 2016, Drury) on social identity in involuntary social influence;
- £297K (BBSRC, 2017, Reby) to understand how dogs hear human voices;
- £621K (MRC, 2019, Hall) on the role of blood-supply failure in Alzheimer's disease;
- £817K total award (£321K to Sussex; ESRC, 2020, Drury) to develop a relational model of collective fear responses;
- £560K (MRC, 2020, Koya) on the neural basis of how environmental enrichment may reduce food craving.

Strategic changes aligning our research with major national priorities also increased our ability to attract government-related funding. NIHR funding has more than quadrupled from £0.36M (REF2014) to £1.53M in this period. For example, Fowler led on PRODIGY, a definitive multi-centre trial worth £2.1M (£376K to Sussex). This trial, alongside others during this review period (e.g., SuperEDEN), led to a new time-use assessment of social recovery, now adopted widely in the field. Likewise, Greenwood led on the NIHR-funded multi-centre Early Youth Engagement (EYE-2) project (£1.72M), generating £392K at Sussex.

We continued to secure significant new funding from major UK charities, including:

- £225K (Education Endowment Foundation, 2015, Easterbrook) on self-affirmation in academic performance;
- £152K (Leverhulme, 2015, Brown) for a major research fellowship evaluating the work of Henri Tajfel;
- £222K (Leverhulme, 2017, Reby) on gender stereotyping from the human voice;
- £372K (Leverhulme, 2018, Yeomans) assessing the neural basis of odour-taste learning.

Other significant sources of funding include industry (total £560K), for specific projects and as direct contributions to larger projects, and philanthropic donations (e.g., £1.5M in 2017 from the Rudd Foundation to further support our Rudd Centre).

3.2 Infrastructure and facilities

The substantial refurbishment when the School was first established placed us in a strong position to grow during the REF2021 period without the need for significant changes in core office and laboratory infrastructure. We have nonetheless benefited from major refurbishment of the University's **Biomedical Research Facility** (2020: £995K), and from continued University and School-based investments to support newly appointed faculty.

A major School-funded infrastructure project was the successful refurbishment of disused lab space to generate the **Beatrice Edgell Research Hub** (£70K), a dedicated postgraduate research space named after the first British woman to be awarded a PhD in Psychology. The Hub combines office space to house 29 of our PGRs with 12 dedicated testing cubicles for human experimental research.

The School's neuroimaging is provided through the Clinical Imaging Sciences Centre (CISC). A key investment was the purchase and installation of a £3.2M state-of-the-art Siemens 3T MRI scanner in 2017, partly sponsored by a £570K multi-user equipment grant from the Wellcome Trust, installed in purpose-built facilities at CISC. Psychology collaborates with CISC to support our Neuroscience and Sensory Systems focus areas, and the business case for the

3T scanner was heavily influenced by that need. Psychology is an integral part of CISC, with Psychology faculty on the management board.

The School has an extensive suite of dedicated research facilities to support our Research Groups. These include our state-of-the-art **Sussex Child Research Hub**, comprising ten research rooms, including a child-interaction observation unit with one-way mirror, a room with CCTV for videoing child sessions, two rooms for experimental infant techniques with coding facilities, and a developmental psychophysics and eye-tracking room. The suite includes multiple waiting and play areas appropriate for infants, toddlers and older children, and facilities for visiting parents. We also have extensive **Behavioural Neuroscience laboratories**, including a microscopy and histological suite, two laboratories dedicated to electrophysiological studies in brain slices, and shared use of molecular biology laboratories. We are a major user of the **Biomedical Research Facility**, which comprises breeding, holding and experimental facilities for rodents and a surgery equipped with digital stereotaxic equipment for both rats and mice. The behavioural laboratories are equipped for sophisticated operant and observational studies with rats and mice. Also notable is our **Human Psychopharmacology laboratory**, comprising two medical rooms, a wet lab, 15 specialised testing cubicles, including four fitted with Sussex Ingestion Pattern Monitors to measure human food intake, Eyelink eye-trackers, and a fully equipped kitchen for the preparation of food and drink stimuli for research on human ingestion. There are further facilities in our **Human Psychophysiology and Psychoacoustic laboratories**: six cubicles, two acoustic booths and a reception area. Equipment includes both Neuroscan and EGI rigs for EEG/ERP, a Magstim TMS rig, and three Eyelink II eye-trackers. Our **Vision laboratories** comprise a suite of six rooms – some designed to exclude natural light – including specialist equipment for presenting visual stimuli. These suites complement other dedicated testing laboratories, covering a broad range of psychological disciplines from wet labs to human eye-tracking, to dog-and-owner behavioural testing booths. We also have a general testing space, consisting of 11 bookable test cubicles, waiting area and kitchen.

Research success is founded on a cohesive and supportive social infrastructure. This is both physical (e.g., social space) and virtual (online fora), and it aims to promote not only academic interactions but also interpersonal well-being. We have increased the social space available for informal interactions between academic and professional services staff, as well as ECRs and doctoral students, which sparks novel opportunities for collaboration and support. We have developed an online discussion space supported by a new professional services post (Communications Officer, 2018-). Here, staff can access the latest developments and opportunities, while airing views and sharing best practice on its integrated online discussion board. We promote continued professional development through multiple weekly research talks, including School-level weekly colloquia. Our cross-cutting research structure allows for interdisciplinary discussions at numerous Centre-hosted talks (e.g., Sussex Neuroscience) as well as through Research Group seminars, specific doctoral programmes (e.g., Leverhulme DTP), and a host of lab seminars (e.g., Cognitive Neuroscience and Imaging, Synaesthesia, ChatLab, etc.). Finally, we have increasingly focussed on personal well-being as a goal for our social infrastructure, hosting well-being events and social groups to enhance welfare, complementing our annual Research Awaydays and Research Group meetings. This includes staff Zoom sessions (e.g., a murder mystery, performed by 172 staff and students) to help staff and students feel connected during the Covid-19 pandemic.

The climate emergency has also led to specific consideration of environmental impact in the way we plan and conduct our research. Recognising this, we introduced (2019) the role of Faculty Green Officer, held by Rae. Her expertise and enthusiasm have imbued our research activities with sustainability and decarbonising activities (e.g., paper-free testing), and our work has been recognised though **Best Newcomer and Gold awards in Sussex's NUS Green Impact** scheme (2020).

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

4.1 Research networks and partnerships

The School is well connected nationally and internationally, and we host and participate in influential research networks that make distinctive contributions to society and wider research agenda. Through our **Mental Health** focus area, we have developed close relationships with national clinical stakeholders, including the Sussex NHS Trust. This partnership promotes research-oriented postgraduate practitioner training, and collaboration in developing best practice and research. Many of our clinical faculty also hold roles in the Sussex NHS Trust, focussing on mindfulness, psychosis, mood, anxiety, and hearing voices. For example, Fowler leads the 'Starting Well' theme of the Kent, Surrey and Sussex NIHR Applied Research Collaboration. This fosters youth mental health research partnerships between the NHS, local authorities, voluntary sector, social care, parents and schools.

Another flagship example is the Sussex-led ESRC-funded "eNurture Network". Launched in 2018 and led by Harold, this links Sussex with leading research centres at Nottingham, KCL, Exeter, Edinburgh and LSE. The network advances our understanding of how to help families and professional agencies improve mental health for children and youths in a digital world. A second key network, led by Cartwright-Hatton and funded by the Kavli Foundation (£583K), unites Sussex with Southampton and KCL to promote digital interventions for anxiety in parents and children. Like eNurture, this network is changing the agenda within Psychology to enhance well-being via online platforms. Conceived prior to the Covid-19 pandemic, the benefits of these projects were brought into sharp focus by the recent worldwide pivot to digital interactions. Together they host multiple programs to address the impact of digital services on human psychology, and have succeeded in engaging hard to reach groups, often living in precarious situations (e.g., care leavers).

A third example of network excellence in mental health is Greenwood's NIHR-funded multi-centre EYE-2 Network, which unites researchers and NHS clinicians across multiple sites (e.g., London, Oxford, Manchester, Norfolk, Cambridge, Hampshire). By recognising the dangers of attrition in therapy attendance, this network promotes uptake in youth psychosis intervention programmes nationwide (early data suggests an improvement of up to 10%).

The School is also involved in other funded research networks that make a distinctive contribution to mental health worldwide. For example, Michelson and Fowler's funding from NIHR and Innovation for Global Health Transformation supports a network of NGOs that have addressed severe youth mental illness in Nepal, India and Malaysia. An award from Academy of Medical Sciences to Gaysina allowed her to create a network in Central Asia, and Michelson and Badiani have used GCRF funding (UKRI) to establish a clinical network exploring problem alcohol use in India. These networks show evidence of engagement with diverse communities and publics, a central ethos of our School. Other examples of impactful networks include research relationships with Public Health England (Drury, Harris), the Early Intervention Foundation (Banerjee, Harold), and the Pan Sussex Autism Network (Simner, Yuill).

4.2 International and national research collaborations

Research faculty members each maintained links with seven collaborators outside Sussex on average during this REF period, with institutions across mainland Europe (>60 collaborations), the USA (>40 collaborators), and worldwide, as well as >150 collaborations UK-wide. For example, Ward's study of neurodiversity in the senses involves interdisciplinary collaborations with Departments of Art (Oxford's Ruskin), Music & History (Munster), Genetics (Max Planck Nijmegen), and Neuroscience (Bern) while his outputs range from science articles to film installations (Wellcome-funded "Sensorium Tests"). Meanwhile his collaborations with mainland China (Southwest University, Chongqing), show for the first time that traits associated with autism differ cross-culturally (attention-to-detail increases in the UK but decreases in China). This international perspective on neurodiversity and pathology has set the agenda for "de-westernising" autism research. Likewise, our extensive UK collaborations involve psychology groups in the majority of UK research-intensive departments, but also connect Sussex Psychology with disciplines as diverse as biology, neuroscience, history, psychiatry, food science, nutrition, physics, and scientific computing.

Other international relationships also offer a crucial global perspective on topics that would be impoverished, or even biased, by a UK-only perspective. An example is Vignoles' leadership of the Culture and Identity Research collaboration, involving over 75 collaborators spanning 38 nations. Their rationale is that only by uniting international efforts can the constructs of cultural human thought be fully understood. Supported initially by Sussex ESRC funding, Vignoles' international collaborations continue to enrich the research environment, influencing current thinking on culture and identity processes. For example, their *Cultural Models of Selfhood* measures have recently been adopted by numerous labs, and major new multinational studies (e.g., Happiness Meanders Project, Polish Academy of Sciences; International Situations Project, University of California). Such networks also tackle the replicability crisis, by allowing new branches of each network to reproduce existing findings.

4.3 Relationships with key research users, beneficiaries and audiences

Users, beneficiaries and audiences for our research include government departments, public services, regulatory bodies, local authorities, charities, industries, and individual organizations. At a government level, we engage with agencies such as the Department for Work and Pensions (Harold, Sellars), Welsh Government (Banerjee), Department for Education (Oakhill, Franklin), Department for Digital, Culture, Media & Sport, and the Civil Contingencies Secretariat (Drury). This (latter) executive department of the British Cabinet Office is responsible for emergency planning in the UK and has embraced Drury's work on crowd behaviour in its planning for national emergencies (including in the government's Covid-19 response; see below). Internationally, Ormerod's partnership with the United States Federal Bureau of Investigation (FBI) has developed non-coercive and ethical techniques for interview protocols. Our research also feeds into UK national agencies and non-departmental public bodies, including the Equality and Human Rights Commission (Brown), Council for Advertising Policy and Advertising Standards Authority (Dittmar), Gangmasters and Labour Abuse Authority (Ormerod), and multiple levels of the NHS (e.g., Cartwright-Hatton, Greenwood).

At local government level, we have strong relationships with East Sussex, West Sussex and Brighton & Hove City Councils, as well as London boroughs (e.g., Hackney Council), enhancing local environments in terms of transport (Hole), public health (de Visser), recycling (Jessop), schooling (e.g., Horst) and special educational needs and disabilities (Franklin, Simner, Yuill). These same researchers also liaise with scores of head-teachers directly, providing benefits across multiple levels of education (nursery, primary, secondary, and continuing education) including for example Simner's "well-being audit" of local schools, to highlight struggling classes for intervention.

We also provide consultation and knowledge-exchange to charities, which represent key stakeholders and beneficiaries of our work, and bridge between academia and the public. For example, Simner's MULTISENSE project brought together several hundred nationwide end-users of her research in children's sensory differences, including representatives from every major UK autism charity (e.g., National Autistic Society, Autistica, Aspens). Other charity highlights include our work with Sustrans and BRAKE, in walking, cycling and road safety (Easterbrook, Hole), numerous patient advocacy organisations (e.g., Tourette's Action – Rae; Alzheimers Society – Rusted) and considerable work by McComb in animal welfare (e.g., Mane Chance Equine Sanctuary, University Federation of Animal Welfare, Convention on the Conservation of Migratory Species of Wild Animals). Together, our charity engagements not only raise awareness, but also enhance public confidence in scientists.

Our engagement with industry is evidenced through faculty consultancies: e.g., Franklin with Aznobel (2014), Cosatto (2015) and GF Smith (2018), and Bosten with Johnson & Johnson (2019), embedding their work on colour vision. Industry relationships not only enhance our funding-portfolio, but also encourage innovation towards the wider applications of our research. For example, in the food industry, Yeomans' Knowledge Transfer Partnership award with Leatherhead Food (£230K from Innovate UK) embeds his measures of human appetite, mood and cognition into the work-model at Leatherhead, allowing them to offer broader services to their multiple industry members. We also contribute to enhanced safety in the live-events industry (with Drury's crowds research and training for events-professionals) and apply our

research to enhance team performance across diverse sectors (Vignoles' **Impact Case Study**). In summary, we have sought to maximise relationships with key users and beneficiaries by embedding this as a direct goal in our School Strategy (with dedicated structures; **1.5.1**) and fostering a wider School ethos of engagement with research end-users.

We have also engaged in direct activities to enhance public understanding of science, including public lectures (e.g., Reby, Royal Institution Christmas lecture, 2017), television documentaries (e.g., Pike, 2015, Channel 4's *Secret Life of 4,5, & 6 Year Olds*), radio interviews (e.g., Gaysina on depression and memory, Sky News Radio 2019), podcasts (e.g., Cartwright-Hatton, BBC Sounds *All in the Mind, 2019*), as well as arts events inspired by our work (e.g., Franklin's work on infant colour vision inspired *Kaleidoscope*, performed at the Northern Stage in Newcastle, 2019; see also Table 1b). Our research features widely in the news: Altmetrics data indicate our 1364 publications during this REF period generated 3373 news stories. These activities are now further supported by our Visiting Professor of the Public Understanding of Psychology, broadcaster and presenter Claudia Hammond (2019-ongoing).

4.4 Contribution to the research base, economy and society

4.4.1 Research base

Our contribution to the wider research base is evidenced through multiple **prestigious awards**:

- European Association of Social Psychology Tajfel medal for lifetime achievement in social psychology (Brown 2014)
- Distinguished Investigator Award by the International Behavioural and Neural Genetics Society (Stephens 2015).
- British Psychological Society, Social Psychology Section, Distinguished Career award (Brown 2016).
- Applied Vision Association David Marr medal (Bosten 2018).
- Mid-Career Award by the British Psychological Society Social Psychology Section (Drury 2019)
- Elected Fellow of the Academy of Social Sciences (Dittmar 2019)
- Elected Fellows of the Association for Psychological Science (Dienes 2019; Dittmar 2020; Harris 2020)
- European Behavioural Pharmacology Distinguished Achievement award (Badiani 2020)
- Finalist, ESRC Celebrating Impact Awards (Oakhill 2015, Drury 2018)

Further evidence of our wider contribution to the research base has been through service on national and international research funding bodies. Ormerod currently serves as Chair and Horst as panelist on ESRC Grant Assessment Panel A. Garnham serves on the UKRI FLF Peer Review College and the La Caixa Foundation InPhInit selection panel for studentships and served on the ERC Consolidator grant panel until 2018. Leavens served as invited expert for European Commission call ERC-2016-STG, Badiani for the French National Research Agency (ANR), Franklin for the Inner Assessment Panel of the Irish Research Council, Harris on the funding body of Cancer Research UK, as well as a number of staff on grant-awarding committees nationally and internationally (e.g., Dittmar, Sweden; Yeomans, Netherlands). Finally, Harold has made extensive contributions to numerous research bodies: ESRC Capability Committee (2016 onwards), Steering Group for the ESRC Longitudinal Studies Review (2017-18), member of the ESRC Strategic Advisory Network (2015-ongoing), and cross-council representative in biosocial research for UKRI/ESRC/MRC. Our engagements support research infrastructure at its very core, underpinning support for research across higher education, and ensuring sustainability.

Faculty also made important contributions to international and national academic societies. Ward became President of the British Association of Cognitive Neuroscience (2019), and Field founded the Royal Statistical Society special interest group for Teaching Statistics. A number of staff have been elected fellows (e.g., Morcom, of the international Psychonomic Society, 2018) or chartered members of eminent societies (Field became Chartered Statistician of the Royal Statistical Society) or joined advisory boards and steering committees (e.g., Dittmar in the

Centre of Appearance Research, Bristol). Faculty have also made significant contributions to societies that improve welfare, for both adults and children (e.g., Cartwright-Hatton as contributing member for National Institute for Health and Care Excellence (NICE) guidelines on Social Anxiety Disorder) and of animals (e.g., McComb's work for Universities Federation for Animal Welfare).

Faculty in Psychology also served widely and prominently on journal **editorial boards**, including 6 Editors-in-Chief: *Infant and Child Development* (Banerjee), *European Journal of Social Psychology* (Vignoles), *British Journal of Social Psychology* (Drury), *Cognitive Neuroscience* (Ward), *British Journal of Nutrition* (Yeomans) and *Journal of Experimental Psychopathology* (Field). A further 17 served as Associate Editors, including Dienes (*Royal Society Open Science*; *Frontiers in Psychology*; *Psychology of Consciousness: Theory, Research, and Practice*; Registered and Exploratory Reports Sections in *Cortex*; *Neuroscience of Consciousness*), Morcom (*Psychological Research*; *Royal Society Open Science*), and our 31 additional editorial board appointments include publications such as *Psychological Science* (Simner), *Cortex* (Dienes), and *Journal of Child Psychology and Psychiatry* (e.g., Pike).

4.4.2 Economy and Society

There is evidence of our research impacting positively on the economy and society. Key examples were described earlier through our **Impact Case Studies (1.3 & 1.5),** which were drawn from a larger pool of impact work, reflecting the deep and broad value of our research, illustrated in Table 1.

Table 1 Examples of impact on society, policy and practice

Faculty	Underpinning research	Impact
A) Impact on Policy and Practice		
Brown	Research on experiencing hate crime	New Crown Prosecution Service policy on the use of community impact statements (August 2018)
Rusted	Research on quality-of-life when caring for dementia	All-Party Parliamentary Group on Dementia report (April 2019) recommending emotional support from employers
Horst	Research showing repeated reading techniques dramatically improve children's vocabularies	Adopted in schools and nurseries nationwide e.g., the *Again!* project by Durham County Council in >71 of their local settings
Greenwood	Development of psychological interventions in the EYE-2 manual	Changing practices among 350 NHS clinicians, in 10 NHS trusts working with 3500 psychosis patients, improving engagement by 10%
Harold & Sellers	Effects of interparental conflict on mental health in children and adolescents	Government policy promoting improved life chances for children, new guidance for local commissioners, funding to support parental relationships
Hole	Research showing hands-free phones are distracting when driving	Parliamentary evidence in Select Committee recommendations to ban drivers using hands-free phones (2019)
B) Impact on Society and the Economy		
Dittmar	Evidence of unrealistic body shape of toy dolls influencing body-shape dissatisfaction	Influenced major redesign of well-known toy dolls by key manufacturers

Faculty	Underpinning research	Impact
Ormerod	Developed the Controlled Cognitive Engagement interviewing method for transatlantic passenger-screening (winner, BPS Cognitive Section best paper, 2016)	Adopted by American Airlines, Delta and Emirates, and the EU-funded ARMLET centre (Romania) for training air marshals
Ward & Simner	Identified and classified synaesthesias, with extensive knowledge exchange	Scientific legitimacy for synaesthesia, and greater self-organization evidenced by proliferation of community projects (e.g., Synaesthesia Dance Experience)
Yeomans	Elucidated how the interaction between nutrient content and consumer expectations influences consumer eating and drinking behaviours	Influenced food manufacturers' (Suntory, Mondelez, Nestle, Mars) reformulation of products to reduce fat and sugar content to meet Government targets.

4.4.3 Covid-19 related research activity in the School

Most recently, UoA4 researchers have refocussed their research in order to contribute to the national pandemic response, and have made significant contributions in relation to mental health, lifespan development, and public behaviour. Fowler's local leadership within *Starting Well* (see 4.1) oversaw the delivery of national mental health surveys for youth and students. His work with colleagues (Banerjee, Greenwood, Michelson) is informing mental health support in marginalised communities and vulnerable groups such as care-leavers. Yuill provided key insights into effective delivery-methods for mental health support (e.g., video vs in-person), while Greenwood demonstrated the impact of Covid-19 on incidence of psychosis. Greenwood and Cavanagh's rapid implementation of remote psychological therapies has been submitted to the House of Lords Covid-19 committee inquiry into digital technology, to inform future national provisions.

With respect to children, schools and families, Lester illuminated the negative mental health outcomes of lockdown on family life, as well as key mitigations. Easterbrook demonstrated exactly how home-learning is more difficult for pupils eligible for free school meals, quantifying their lack of space, technology and WiFi access. And within ageing populations, Miles, Rusted, and Harris produced a Covid-19 guide for carers, to allow mask-wearers to better interact with people with dementia.

Drury has made significant contributions as a participant in SAGE's subgroup of behavioural science (*Scientific Pandemic Influenza Group on Behaviours*; SPI-B). He provided key guidance and expertise on issues relating to re-opening large events, on the social benefits of 'bubbles', on (non)punitive approaches to lockdown offenders, and on the role of public volunteers. He also published 'what works' briefings for emergency responders co-working during the pandemic. Through his role in *Independent SAGE*, Drury has also co-authored recommendations on *Find Test Trace Isolate and Support.* Via his role within the British Psychological Society Covid-19 task force, he co-authored guidance on community resilience, self-isolation, and the use of behavioural science in disease prevention.