Institution:
University of Essex

Unit of Assessment:
4 – Psychology, Psychiatry and Neuroscience

1. Unit context and structure, research and impact strategy

General Overview

The Department of Psychology at Essex supports world-leading, interdisciplinary research that promotes a better **Understanding of Our Place in the World**. This organisation of our research mission allows us to unite and synthesise knowledge across core psychology disciplines and beyond. To contribute to our mission, staff work across three research themes that dismantle conventional, disciplinary boundaries and that match our broad research strengths: **Thinking about the World, Interacting with the World**, and **Experiencing the World**. This unique approach benefits from the use of multi-methodological approaches, while nurturing the translation of our research findings into practical tools that benefit society.

Research and Impact Strategy

The Department was ranked joint 13th in REF2014 (intensity weighted GPA, THE) and laid out clear plans that focused on **maximising research intensity**; continuing to grow our **world-wide reputation**; **enhancing the translational potential** of our research; and **investing in our researchers** through recruitment, mentoring and development and **enhancing our research infrastructure**. Our ongoing research vision for maintaining excellence through planned rapid growth led us to develop a novel conception of the Department as an environment defined by research crossing conventional disciplinary boundaries. We moved away from traditional distinctions of research groupings still in place for REF2014, in favour of a more progressive, forward-looking, generative approach. We devised this framework guided by a conception of a Department that would drive **collaborative efforts with impact focus** more-closely matched to the current needs of society and, accordingly, that were better-suited to meet prevailing calls from funders that require cross-disciplinary approaches. This new initiative was embraced and shaped by all staff at a research-focused 'Away Day' in 2018. **The overarching aim of our initiative is to leverage the Department's strengths in diverse areas by fostering interdisciplinary research links and by replacing traditional 'research silos' with cross-disciplinary think tanks**.

With a view to generating world-leading research that has a lasting and measurable impact on society, the initiative begins – as noted above - with the holistic vision of **Understanding Our Place In the World**. Under this broader goal, we focus on research efforts that address how individuals are **Thinking About the World**, **Interacting with the World**, and **Experiencing the World**. The theme clusters are of roughly similar size (25-35 staff, with contributions to multiple themes possible) and have senior staff as theme leads (Hibbard, Paulmann, Pekrun), who facilitate the themes operational management. This approach allows staff to pursue their intellectual ambitions and to achieve research excellence, while fostering an interdisciplinary approach promoting collaboration and utilising multiple, complementary methodologies. Since presenting this framework publicly (e.g., website, recruitment pack) we have seen excitement about its promise from high-calibre scholars of different seniority applying to work at Essex (e.g., Stoet, Yamaguchi, Korb, Vrticka).

Our updated strategic aims up to 2020 were thus to further grow and firmly establish us as an internationally well-connected Department that produces societally relevant research that is not restricted by disciplinary boundaries. This objective has been met through:

- large-scale growth that allowed us to recruit promising early career researchers and established leaders in their respective fields, as well as retain excellent researchers;
- reframing of our research mission;
- targeted research infrastructure investments;
- supporting impact activities financially and through dedicated staff;

- providing a supportive environment that facilitates our activities with a strong focus on career development opportunities guided by principles of diversity, equality and inclusion.

Achievements

1. Recruitment and retention of excellent researchers

We have appointed 35 new staff since January 2014 and thereby more than doubled in size (21 FTE were submitted to REF2014, increasing to 51 FTE for REF2021; 4% average turnover). We made significant investments in appointing staff who can lead and develop our new research themes (e.g., Professors: Eacott, Pekrun, Stoet; Senior Lecturers: Juanchich, Yamaguchi). However, we have predominantly focused on strengthening our skill base through appointing early career researchers (ECRs) with excellent track records and research trajectories (e.g., Filipetti, Gutierrez, Hanel, Korb, Klabunde, Lamarche, Lisi, Vrticka). We additionally increased specialist technical staff (e.g., Boalch, Broggin, Fowles,) to further support this growth. Strong staff development is evident in more than 20 promotions since REF2014 (e.g., Geereart, Gillmeister, Sandstrom, Sirota, Rieger). Research excellence of staff is evidenced by outstanding publication quality and emerging grant capture for ECRs (e.g., Clarke, Sandstrom, Korb). Since REF2014, staff have published nearly 800 peer-reviewed articles (Web of Science) of which **more than half made data publicly available and more than a quarter included pre-registration practices**, reflecting our commitment to open science practices. Staff have captured project funding from sources including BBSRC, ESRC, EPSRC, British Academy, Leverhulme Trust, Academy of Medical Sciences and Department for Transport. Recent databases of standardised citation indicators (Ionannidis et al., 2020) include seven (Hanley, Foulsham, Orbell, Pekrun, Stoet, Wilkins, Meddis) staff who are **listed amongst the top 1% of cited scientists worldwide**, or 2% of cited Psychology scientists.

2. Investment in infrastructure

Since REF2014, strong investments have been made to **grow and maintain state-of-the-art research facilities** (£390,000), **housed in a specialised lab facility** built in 2009. For example, to facilitate work on developmental neuroscience topics (e.g., Babylab Essex), we invested £50,000 in novel hyper-scanning capable functional near-infrared spectroscopy (fNIRS) facilities. We have also been successful in competitive University-wide funding (PVC-Research and capital investment funds). This **targeted investment** has led to well-equipped, advanced computer labs, electrophysiology (EEG), eye-tracking, physiology, fNIRS, and transcranial magnetic stimulation (TMS, £178,000); functional, modern office space including an independent suite with 12 offices and meeting space (£50,000); a mobile testing van (£50,000); and social spaces that **foster opportunities for innovation, dissemination, training and collaboration**. We have also received financial support for more specialised work on pain, biofeedback and vision research including water bath, physiological and vision display systems (£62,000). Building on considerable investments from the previous REF2014 period, our research management ensured that staff **have access to world-leading facilities** by continuing to invest in planned maintenance and facility enhancement. To support staff with needs for brain imaging, we have **negotiated prioritised imaging access** at the local Colchester Hospital (structural imaging), and in the wider local area (functional imaging at UEA).

3. Fostering a supportive environment that facilitates impact and excellence in research

<u>Organisation</u>

Departmental research organisation is a combination of bottom-up and top-down activities. The departmental research committee (RC) is made up of members from all research themes, includes staff at different seniority levels (SL, Reader, Professor) and is gender and age balanced (3 female, 4 male staff; 3 staff ≥ 50 years, 4 staff ≤ 45 years). It meets formally once per term and serves in a more agile way to discuss pressing issues informally via email and other channels as needed. The RC is chaired by the Director of Research (DoR), and members include Head of

Department (HoD), Deputy DoR, Director of Impact (DoI), Postgraduate Student Director (PGRD), research theme leads, and Transparent Research Facilitator (TRF) to promote open science. Departmental Manager and Head Technician attend relevant parts of the meeting. RC discusses research governance, facility maintenance, expansion for soft-and hardware, seed-corn funding, general research and impact support activities and PGR training. It promotes a strong research culture by sharing best practices. DoR and DoI attend termly Faculty RC meetings and are linked to the University's Research Enterprise Office (REO) staff who support funding applications and impact activities. The linked REO Research Development Manager (RDM) regularly communicates funding opportunities and supports grant writing. Theme leads act as advocates for their research domain on RC and ensure that investments are strategically implemented. Theme leads convene meetings to facilitate research communication within the Department and also provide support in grant writing. They ensure all staff can benefit from being part of an intellectually stimulating community with state-of-the-art facilities. The TRF runs regular activities (seminars, workshops) to encourage best practices. A departmental Moodle site with research information and support documents is regularly updated by RC members and support staff. Departmental Zoom research discussion channels enhance rapid communication and support, especially important during COVID-19 times.

Finances

The DoR oversees the **annual research budget (~£67k)**. Funds predominantly cover: 1) seed-corn funding for (collaborative) projects leading to grant proposals or excellent publications; 2) contributions to open access publication fees to enhance accessibility and visibility of outputs; 3) small research equipment or software needs; and 4) individual personal research budgets of £1000 each for discretionary research funding by academic staff. Moreover, the Department has introduced a fund to support work of post-doctoral researchers to help foster independence (£1000/year to bid for). A similar scheme runs for PGRs. Research seminars are supported with £4,500 yearly. The Department runs an Open Science Incentive Scheme. Equipment and consumable needs are funded from an **additional yearly budget of £40k**.

Open Science

We **embrace the values of open science (OS) that go beyond publishing open access**. This includes teaching about the replication crisis in psychology and how open and transparent research practices can alleviate this issue (statistics; research methods). We provide an environment that supports staff and students in making their data, materials and analytical code publicly available as well as in pre-registering their studies: staff and PGRs are financially rewarded to conduct and publish transparent and open research. To be eligible, research needs to follow the three principles of OS: open data, open materials, and pre-registration. A change in practice is clearly evidenced by a significant increase in staff publishing through gold open access (**30% of all publications since 2014 are gold open access**).

We run an open access publication fee scheme every term to provide financial support for publication fees. The University also has access to UKRI block grant funding that can be used to support open access funding (linked to UKRI funded projects). The University has open access publishing agreements with Wiley, SAGE, Springer, CUP and PLoS. More agreements are under negotiation.

Our Transparent Research Facilitator facilitates OS practices by: regularly reviewing recommendations about reproducible and transparent research practices; informing staff about these; offering workshops on OS practices; providing individual advice on implementation of transparent research practices; inviting guest speakers to further promote OS.

Other positive changes include **staff making data publicly available for 54.7%** of their published outputs in 2020 compared to 18.6% in 2016. **Pre-registration of publications also increased** significantly, now at 26.7% (against 1.3% in 2016). The TRF chairs the 'Essex's Open Science Working Group' which is part of the UK Network of OS Working Groups. It meets bi-monthly with

40+ members across the University. They organise training and workshops (e.g., pre-registering studies; sharing data; how to use the Open Science Framework).

Staff have contributed to large-scale replication efforts of psychological research (Sandstrom, Sirota, Korb, Hanel). Sirota will co-lead a Horizon2020-funded work package to develop an OS strategy for Young Universities for the Future of Europe partners and collaborates with Elsevier on OS and trust in science. We are a founding member of the South East of England Replication in Psychology Syndicate formed in Autumn 2020 to promote research reproducibility.

Collaborations

Our staff are active in many within-department and cross-University collaborations which are complemented by strong **international links** (Section 4). Nearly 60 scholars visited the Department since REF2014. The University supports international visits with a fellowship programme. International visitors (e.g., from Australia, Canada, USA, Korea) received funding from the British Academy, Essex International Visitor Fellowship and other sources to collaborate with Essex staff. Projects pursued during these visits are aligned with key interest areas.

Research Outcomes

Staff publish work in leading journals and are doing so more than ever. While 18.6% of all staff papers published in 2014 were in the top 10% of psychology and neuroscience journals (CiteScore), this nearly doubled to 36.2% in 2020. Similarly, when focusing on the Department's outputs in the top 10% for citation globally, 10.9% of outputs were among this elite list in 2014, increasing by more than 60% in 2020, to 17.6%. 70 research projects (totalling £3,666.000) were funded from diverse sources including Academy of Medical Sciences, Austrian Science Fund, American Institute of Bisexuality, Bial Foundation, BBSRC, British Academy, European Commission, ESRC, EPSRC, Innovate UK, Leverhulme Trust, Oculus, Department for Transport, Templeton Foundation, NIHR, RSPB, and The Royal Society. The linked RDM promotes psychology funding opportunities and helps with grant applications. **This support is particularly helpful for ECRs** who are less experienced and benefit from the personalised approach. The Department introduced obligatory peer-review of grant proposals since REF2014 to support staff in preparing high-quality applications. The DoR also feeds back on applications and keeps a list of comments to help outline recurring themes in feedback. This helps to target support for areas of developmental need. The **University provides match-funding for equipment costs** in UKRI grants. Grant holders receive 10% of the indirect costs recovered from their grants (capped at £20k) in recognition of their performance. This can be taken as salary, University-based childcare payments or awarded into personal research incentive accounts.

Activities and Achievements

One goal of reframing our research mission was to **better facilitate exchange of new ideas** and research programmes, **development of grant applications** and our approach to methodological challenges. Below, we present selected research to illustrate **our theme activities** and **achievements** since REF2014 and to highlight how we achieved our goal to **produce societally relevant research** not restricted by traditional boundaries.

Thinking about the World

Research in this theme focuses on the psychological underpinnings of individual and group motivated behaviour and reasoning. It brings together researchers applying different methodologies to study how **people make decisions** (Buchanan, Clarke, Cooper, Dawtry, Juanchich, Lamarche, Lisi, May, Roberts, Rolison, Russo, Sirota, Van Tilburg), **remember** (Eacott, Hanley, Loaiza, Ward, Zengel), and **feel and act** (Cozzolino, Gillmeister, Klabunde, Mahadevan, Orbell, Paulmann, Pekrun, Poerio, Sel, Valentini, Van Tilburg, Zengel); this is studied in the **political arena** (Cozzolino, Dawtry, Hanel) and in **health and disease** (Barry, Cooper, Dent, Foulsham, Gillmeister, Hanel, Orbell, Paulmann, Rolison, Valentini). Staff have strong skills in

experimental behavioural, electrophysiological and neuromodulatory techniques and their success is mirrored in their **strong publication profile** both in terms of quantity and quality and which includes outputs in leading journals including: *Proceedings of the National Academy of Sciences*; *Journal of Personality and Social Psychology*; *NeuroImage*; *Psychological Medicine*; *Journal of Personality*; *Health Psychology*; *Pain*; *Cortex*; *Proceedings of the Royal Society B: Biological Sciences*; and *Human Brain Mapping*. **The wide variety of funders** reflects the interdisciplinary outlook: the British Academy supported Orbell's research on persuasion and health behaviour change. Her expertise in psychosocial health allowed her to evaluate the uptake of bowel cancer screening that led to changes to recommendations in practice (impact case). The **ESRC** funded risky decision-making research (Rakow), while the **EPSRC** supported Rolison's work on age-related biases in existing measures of driver crash risk and Ward's work with the NHS and BBC on privacy and consent management in future pervasive environments. Other funders include the **European Commission** (Ward's research on using technology to augment human memory); **Innovate UK** (Russo, Rolison and Buchanan evaluated patients' acceptability of an AI-driven automatic triaging system); **Leverhulme Trust** (Sirota and Juanchich for work on (ir)rational decisions); **The Bill & Melinda Gates Foundation** (Rigato); **NIHR** (Juanchich); **Department for Transport** (Rolison's work on mobile road accident reporting; impact case). Collectively, **research conducted under this theme has contributed to improving people's lives** from the development of a mobile traffic accident reporting device that reduces biases in accident reporting to changing cancer screening procedures leading to reduced deaths caused by bowel cancer (see impact cases).

Interacting with the World

This theme contributes to our understanding on **how we perceive and present ourselves in relation to others** and **how this affects our behaviour and well-being**. Staff study individual and group processes that are **fundamental to social relations** and that address questions around **social wellness** (Buchanan, Cooper, Mahadevan, Paulmann, Poerio, Sandstrom, Zengel), **sexual and interpersonal relationships** and their links to **identity and meaning of life** (Cozzolino, Klabunde, Lamarche, Mahadevan, Poerio, Rieger, Sandstrom, Orbell, Van Tilburg, Zengel), **justice and trust** (Cozzolino, Dawtry, Hanel, Lamarche, Mahadevan, O'Gorman, Stoet). They also focus on **education, language and cross-cultural processes** and their interaction (Barry, Hanley, Geeraert, Guiterriez, Hanel, Paulmann, Pekrun, Stoet). Staff regularly publish in the **most prestigious journals** including: *Journal of Personality and Social Psychology*; *Nature Communications*; *Educational Psychology Review*; *Journal of Educational Psychology*; *Journal of Experimental Psychology: General*; *Cognition*; *Developmental Cognitive Neuroscience*; or *Psychonomic Bulletin & Review*. **Work has been funded** by **American Institute of Bisexuality** (Rieger's work on sexual relationships, orientation and arousal); **British Academy** (Gutierrez explores how COVID-19 information is communicated to deaf people); **European Commission** (Foulsham's contribution to promoting social interaction); **ESRC** (Sandstrom studies how to improve difficult social interactions); **ESRC Impact Acceleration** (Lamarche studies the impact of befriending programmes on health and well-being; Paulmann's works with private sector companies on the role of prosody in the classroom); and **Leverhulme Trust** (Callan's projects on reasons behind innocent victim rejection and personal deprivation; Weinstein and Paulmann's work on motivational language). **The impact of this theme's research is widespread** and includes highlights such as Sandstrom's research **informing millions of BBC viewers/listeners about the benefits of talking to strangers** and inspiring the Tate Modern to change its museum guide training practices. Cooper and Orbell's research **transformed over 200 military veteran's lives with post-traumatic stress disorder** through a novel intervention programme. Staff use multiple methodologies including self-report, behavioural observations, and (electro-)physiological measures to provide **a wide-ranging look into the psychological processes underlying society's pressing issues** and that guide our most important social interactions.

Experiencing the World

This theme aims to unravel the physiological and neural underpinnings of how we experience our **body states** (interoception; Filipetti, Gillmeister, Hughes, Klabunde, Korb, Sel, Valentini), **how we**

see (Clarke, Cole, Dent, Foulsham, Hibbard, Hughes, Kennet, Lisi, May, van Dam, Yamaguchi) and **how we control our actions** (Buchanan, De Klerk, Hughes, Kennett, Russo, Sel, van Dam). Staff further answer questions on how our perceptions and experiences **change as we age** (De Klerk, Filipetti, Klabunde, Loaiza, Poerio, Rigato, Simpson, Vrticka). Infant and children work is conducted in the **Essex Baby lab, the leading infant lab in the east of England**. Staff use a variety of techniques including EEG, fNIRS, fMRI, TMS/tDCS, physiological and behavioural measures. The **strong publication record** includes work in *Nature Human Behaviour*; *Proceedings of the National Academy of Sciences*; *Psychological Science*; *Cortex*; *Current Biology*, and *Psychological Medicine*. **Work is funded** by: **Academy of Medical Sciences** (Filipetti's research on body perception and representation across the life span); **Austrian Science Fund** (Korb explores the influence of neuromuscular electric stimulation on social experiences); **BBSRC** (Hibbard studies brain processes of three-dimensional vision); **BIAL foundation** (Valentini's research on thinking about death; Hughes' studied the sense of agency during Ouija Board engagement); **British Academy** (Gillmeister investigated atypical body perception; Hibbard's work on 3D vision; Hughes studies naturalistic visual search); **ESRC** (perception of dynamic facial expressions by van Dam); **EIRA** (visual field loss in stroke); **Oculus VR LLC** (Van Dam's research on integrating senses into virtual reality); **The Guarantors of Brain** (Filipetti's line on body perception); **Leverhulme Trust** (Hibbard investigated how visual information creates our visual experience); and **Suffolk Mind** (Hibbard developed an e-learning platform). **Theme research leads to impact** as companies **develop and improve** their **products** (e.g., coloured page overlays; colorimeter device to prescribe precision tinted lenses; impact case) and **informs consumer virtual reality** through perception science (e.g., virtual learning environment; gamer's avatar response). Research has also **influenced industry lighting standards** and supported health and wellbeing by improving lighting (impact case). The **interdisciplinary and multi-methodological angle** of this theme ensures that the world-leading work **funded by a variety of sources** has direct **implications for diverse sectors** such as arts and performances; health; and biomedicine.

Research and Impact Strategy, Objectives and Plans up to 2027

We have grown significantly and will continue this growth trajectory over the next 5-7 years, creating an even more vibrant research environment that fosters collaborative, inter- and cross-disciplinary efforts. The shared long view of the Department leverages the **increase in critical mass**, with a clear mission of ensuring that **staff thrive in an environment that supports research that makes a difference** and in exploring promising, newly emerging areas of psychology (e.g., interoception). As outlined, the pursuit of our mission requires a shift from traditional siloed approaches of research activity, to a more dynamic and modern collaboration across disciplines, focused on asking – and answering – the questions that impact the lives of people around the world. **We are on a path of transformation**, becoming more of a 'think-tank' of psychological expertise, rather than maintaining the practices of conventional academic departments. This **focus shift** has already shown an increase in consultancy work in which ECR staff are supported and engaged (e.g., Buchanan, Poerio, Van Dam) and **will be cultivated** further to **attract industry income**. Perhaps most important, we are confident that this approach is a **promising path for the future of the Department** and will help nurture new research activities that will address contemporary societal challenges.

Following on from this vision, our future strategy concentrates on four main pillars:

1) To **facilitate high-quality, inter-disciplinary, multi-method research** to foster Understanding our Place in the World, thereby addressing issues directly impacting society. Staff will be supported to **reach out to other disciplines to enhance cross-sectoral and cross-intellectual capacity**. Crucially, this will feed into research student recruitment **enabling future generations** of Essex psychology **researchers to contribute to a clear research mission that will deliver impact for society**.
2) Doubling our research income capture by 2026/27. From 2021 onwards, research theme leads will be specifically tasked to facilitate and contribute to income generation for their theme. They will be supported in these endeavours **through a reduced and selective teaching workload.**

Theme leads will pursue funding calls (e.g. Centre bids, large cross-disciplinary bids) that allow **maximising the Department's potential**. Individual staff will continue to be supported in submitting small and medium-sized bids.

3) To continue to **develop a world-wide reputation** for using multi-method approaches. This will be achieved by leveraging departmental expertise from different fields and further facilitating inter-disciplinary research. Additional **targeted investment** in research equipment will be crucial. Income to support these investments will come from grants, research training events (e.g., summer schools; training programmes), and philanthropy (supported by the University philanthropy team).
4) To **work more frequently with public and private sector companies**. To address this, staff will work with the REO to develop knowledge transfer partnerships and other relevant links. We will continue collaborations with **external stakeholders** and will **increase public engagement** further, especially in terms of **broad research dissemination**.

Collectively, these pillars will ensure that **psychology research at Essex will continue to thrive**.

2. People

Staffing Strategy

The Department has seen significant staff expansion. 35 academic appointments were made since 2014 (53% women, originating from 14 different countries; 2 BAME; age brackets spanning 4 decades). Three appointments each were at professorial (Eacott, Pekrun, Stoet) and Senior Lecturer level (Costantini, Juanchich, Yamaguchi). Building on the successful strategy around ECRs, which was noted by the last REF panel, we made **significant investments** to further recruit exceptionally talented ECRs at lecturer level who would bring added-value to existing strengths or address unmet needs. We are **internationally competitive** in attracting and retaining high-quality researchers as evidenced by **more than 80% of our new recruits coming from outside the UK**. Nine of our most recently hired ECRs published 48.9% of their papers in the top 10% of journals (CiteScore), higher than the UK average (27.6%). In terms of the Field-Weighted Citation Impact, these nine ECRs (FWCI = 1.87) also outperform the average for UK university staff (FWCI = 1.49). **Our strong focus on nurturing ECRs** has helped build the strength and critical mass required for each research theme. Crucially, it has secured **significant potential to build future leaders**. We are committed to providing a **welcoming workplace** for people from all backgrounds and will attempt to **increase diversity** even more in future recruitments. To support this, an equality and inclusion working group was formed (see below). One positive change they introduced includes offering job applicants the opportunity to meet with existing staff who share (protected) characteristics. Our staffing strategy has resulted in a balanced seniority level distribution (21 Lecturer, 17 Senior Lecturer, 13 Reader/Professor).

Staff Development

The Department follows the University's action plan **for implementation of the Concordat to Support the Career Development of Researchers**. The University was re-awarded the HR Excellence in Research award in 2020. Beyond this, new staff receive a departmental and University induction. Our induction includes a formalised meeting with the DoR. This covers research governance; grant application support; ethics; development and training opportunities; and facilities use. Equipment and software needs are identified to prioritise purchases. Teaching, administration, knowledge exchange and other academic contributions are allocated to staff via a Workload Model which is reviewed annually. The model provides staff with a tool to discuss development needs, preferences, and actual workloads with the leadership team to help pursue their research ambitions. Centrally conducted workload monitoring exercises demonstrate staff can devote a high proportion of their time (39%) to research activities. Three staff have trained as workplace coaches (Geeraert, Paulmann, Russo) to offer further support in terms of workload pressures. Annual professional development reviews between HoD and individual staff address objectives around funding, impact and outputs for the coming year and personal development opportunities (e.g., promoting research through media; grant writing workshops; supervision;

leader workshops). Since REF2014, more than 30 different research-related development events were attended. Research activities are collected in an annual monitoring exercise, providing DoR and HoD an opportunity to discuss staff performance and growth potential.

Postdoctoral researchers

Principal investigators support the professional career development of postdoctoral researchers. They hold annual appraisals to ensure that the researcher is adequately trained and resourced. **They foster careers through meetings, co-authoring, and networking**. We also **provide a dedicated mentor to postdocs** and **financial support** for projects fostering independence. Postdocs are invited to staff meetings. Two researchers are currently funded by South East Network for Social Sciences (SeNSS) **ESRC fellowships**.

ECRs

The Department provides **abundant support in guiding ECRs** through the University's Pathway to Permanency. Three-year plans that encompass education, leadership and citizenship and research development goals are drafted by staff, their permanency advisor and HoD. Progress is assessed via 18 and 36 month reviews by senior staff and centrally. ECRs on their pathway to permanency benefit from reduced teaching and administrative workloads (1/3 load in the first year, 2/3 in the second year). The success of the approach is reflected in **100% of newly appointed staff achieving permanency, with 33% securing early permanency** through the support provided. We run a **mentoring scheme** for probationary staff. Mentors provide guidance on achieving targets, support in research funding activities and research project management and on career trajectory. They advise on training provided via the University's People and Culture team which coordinates the University's professional development programme (e.g., Future Leaders Programme). Termly mentor meetings led by DoR and EDI team provide opportunities to discuss recurring issues and share best practice.

Established Staff

Staff at all seniority levels have the opportunity to **become key role holders** to support career development. For instance, Director for Strategy and Marketing posts are held by Lecturers; Admissions, Impact and Education Director posts are carried out by Senior Lecturers. This staff development strategy has proven successful in **securing promotions**. Since 2014, **25 staff promotions were awarded** (14 to Senior Lecturer, 7 to Reader, 4 to Professor; of these combined promotions 35% were female staff; 65% parents to children under the age of 18; 73% international staff). **Psychology staff held key University roles** in this REF period (University PVC-Education: Eacott; acting Faculty Deputy Dean Research: Paulmann; both female; different age brackets).

Technical Support Staff

Seven staff (2 female; different age brackets; 5 parents; 1 BAME) support departmental research activities. The University has signed the **Technician Commitment**, holds membership of HEATED (professional organisation supporting technicians) and offers training and networking opportunities. A technician representative sits on Faculty RC. The departmental operating budget allocates £3,000 p.a. to support CPD, equipment and software training for technicians. The **Head Technician sits on the departmental steering group** and contributes to capital planning bids and departmental equipment funding decisions. Where applicable, technicians are included as authors on publications.

Research Leave

The University has a generous research leave scheme (every 6 terms, 1 term of leave is accrued; time spent on maternity or paid leave of absence counts towards entitlement). The Departmental RC provides feedback on applications to strengthen them from a staff development perspective before they are considered centrally. Since REF2014, 18 staff have been granted research leave

(average length: 2.8 terms).

Research Students

We have a vibrant and active PGR community supported by a dedicated team headed by the PGRD. They serve as contact and oversee student progress and well-being. An administrator supports admissions, progress, extensions and Vivas and is another point of support. The PGRD and nominated staff (balanced for seniority level, gender, age, and nationality varied) review and shortlist PhD student applications for funding. This ensures a fair, transparent process when selecting the strongest candidates for studentships. Since REF2014, **we have invested over £550k in scholarships**. The University Alumni Office provides match funding to external sources.

The PGRD represents the Psychology pathway for the SeNSS-ESRC Doctoral Training Partnership and offers support in preparing applications. Since October 2014, the Department has been successful with **15 research-council funded studentships**, exemplifying the strengths of staff's research project ideas and doctoral students. The **Department** aims **to fund** one to two PhD students per year from the departmental budget. It has been particularly successful in securing faculty-funded **interdisciplinary PhD studentships**. Since the launch of the programme in 2018, 12 students have been supervised by at least one Psychology staff member (2 students with supervisors in Psychology/Sports; 2 in Psychology/Sports/Health and Social Care; 1 Psychology/Maths; 7 Psychology/Computer Science). Students were also **supported through industrial and charity funding bodies** such as Leverhulme Trust, BIAL, Essex Alumni, the Leventis Foundation, Facebook and Arabian, Mexican and Chinese government scholarships.

We have a **policy of dual supervision** (supervisor/co-supervisor or joint supervision) which is in place for within- and between-discipline supervision teams (i.e. students who have at least one Psychology supervisor). This **helps to ensure student progress** and benefits the student by experiencing different supervisory styles. Progress is monitored by bi-annual supervisory boards with a non-supervisor as chair where advice is given and barriers are identified. The aim is to have the chair of the board constant for the student. 90% of students complete within the required period (100% in 2019/20). Several staff were nominated for the **University's supervisor of the year award** (Hibbard and Juanchich won).

The Department provides desks and PCs for PhD students who also receive preferential access to lab space to help complete their studies on time. **The University provides specialised training courses relevant for student progress and development** (e.g. advanced writing, preparing papers for publication) via its unique *Proficio* PhD training programme (runs 150 courses/year focussed on career prospects, progression and wellbeing). Students receive funds to access these courses (£2,500 per student) which are advertised via mailing lists/website. **Engagement is good** (e.g., PGRs attended 'preparing for the viva' and 'GRIT' courses to help build resilience). **Specialised courses are also provided by psychology staff** (e.g., May, Loaiza, Clarke, Van Dam) ensuring the programme offers skills training required for psychology research. *Proficio* offers an opportunity to advance administrative skills: The 2019 Essex Cross-Disciplinary Experimental Methods Conference was organised by Psychology PGR students and funded through *Proficio*. *Proficio* funds support attendance of external training and academic conferences. The Department provides a further £500 p.a. as a personal allowance for students to cover research expenses and conference attendance. A PGR fund allows students to bid for up to £1000 for additional funding. These open, competitive calls train students in grant writing skills and improve their CV.

The Department **holds an annual PGR conference** in which students present their work. Students also attend and present in the weekly seminar series. They are encouraged to attend social events to network. Students regularly participate in the nation-wide 3 Minute Thesis competition (3MT®) and have been successful in doing so. Students can participate in outreach events throughout the year (regular events include nursery visit days (20 children), Big Bang (900 year-9 students); public engagement days (50 attendees)). Teaching skills can be developed by working as graduate learning assistant or giving guest lectures. PGRs have access to PG Cert in

Higher Education Practice. PGR students have successfully applied for recognition of their teaching practices by Advance HE under the UK Professional Standards Framework (9 PGRs achieved D1, 3 achieved D2 status). They are prepared for the academic market by practicing job talks, working on CVs and application letters. Students who completed their thesis during this REF cycle have taken up positions as post-docs (e.g., Marshall, Thorpe, Liu, Redhead), lecturers (e.g., Watts, Clark), work in industry (e.g., Berntsen; Wolinski) and higher education (e.g., Southsworth; Zahid). To help secure academic positions, supervisors support their students to publish thesis work in high-ranking journals before completion (e.g., Raines: *Psychological Science*; Marhall: *Neurobiology of Aging*; Haigh: *NeuroImage*; Holmes: *PNAS*). Supervisors also support students in obtaining other academic achievements (e.g., Watts & Grove: winner of Essex 3MT®; Lotun: £5000 SeNSS award business boost; Liu and Mitchell: winner of social science lab seed-corn funding).

Equality, Diversity and Inclusivity (EDI)

We are **committed to equality and diversity** and to building an **inclusive and open environment** for all. We deliver this **through policies and practices as well as through support for established EDI staff and student networks** (e.g., LGBTQ+ Allies, Access Forum, BAME network) and institutional commitments to equality charters and accreditations (e.g., Disability Confident Scheme, Athena SWAN, University of Sanctuary, Race Equality Charter and Stonewall Top 100 Employer). The University **offers flexible working**, operates a **Report and Support** and **Harassment Advisory Service**. All staff complete training on EDI within six months of joining. We **contributed to the design of the Unconscious Bias component** of the University training. We are **represented on the Achieving Potential Group** which links to work supporting Black and Ethnic Minority (BAME) students. Sandstrom is leading a key work-stream to support the University achieve the Race Equality Charter.

The Department's aim is to foster a confident, high-performing, creative, and productive department, where we support each other in our endeavours. An **Athena SWAN team has been in place since 2015**. The team consists of a changing selection of role-holding staff and students (e.g., fixed-term staff mentor, inclusivity lead). The team meet termly with the HoD, report to staff meetings and organise Open Lunch meetings on changing topics (e.g., parental leave, permanency). While there is a minority of women at senior levels, the **proportion of women has improved** through changes in the way academic posts are advertised (including explicit equality statements) and promoted to personal contacts and mailing lists by existing staff. This has increased application rates from women (53% of staff appointed since 2014 are women). Women have held senior roles within the Department over the past decade: HoD (2 women, 2 men), DoR (3 women, 2 men), Director of Education (3 women, 2 men), Marketing Director (2 women, 1 man), and are well represented across all types of committees. Paulmann serves as Science and Health Professorial Network lead. Similar distributions can be found when **comparing parents and non-parents**. The Department's international profile ensures **cultural diversity on committees**. Our approach ensures that **everyone has similar amounts of time for research activities** and **opportunities for personal development. We hold a Silver Athena SWAN Award**.

Staff **expecting babies** meet with People and Culture staff who discuss support (e.g., health and safety, Keep in Touch (KIT) days, flexible working). We follow University guidelines on maternity, paternity and adoption leave. We conduct risk assessments to identify adjustments. The **University operates a Parents Network**. Staff are encouraged to stay in touch with paid KIT days during their leave. Staff can apply for a career break to extend their leave. Upon return, **staff are allocated a lower teaching and administrative workload** to facilitate re-establishing research and impact activities. Carer funds (centrally funded) have helped staff to attend conferences abroad (e.g., Juanchich, Sirota, Paulmann). The University's People Supporting Strategy sets out an aspiration **to increase the use of flexible working** and we are committed to helping achieve this.

We **monitor gender, ethnic minority and full- vs. part-time distributions in different staff and student bodies**, in **staff committees** and **outreach activities**, to ensure equality of workload and presence of role models. We support the University's endeavours to increase disclosure of

protected characteristics. BAME students are well represented in our UG (36%) and PGT (31%) courses. They represent 20% of our PGR students. We continue our efforts, such as ensuring the diversity of appointment and selection panels and encouraging under-represented groups to apply, as the number of BAME staff is currently low (84.3% staff identify as White). We put in every effort for the department to increase in terms of diversity: recruitment panel members complete University training programmes on EDI Essentials and Unconscious Bias Training; a newly-formed EDI working group generates and implements ideas to **remove systemic barriers in increasing diversity**. Initial **positive changes include initiatives** such as decolonising the curriculum and updating the Department's webpage to make it easier for staff and students to find information relevant to them.

Regular survey data is collected from academic, administrative, and technical staff and students about **perceptions of the departmental culture**, including awareness and perception of support with academic pursuits and perceived equality and inclusivity. **Data indicate that the Department is perceived as fair, transparent and good in supporting** research career development (e.g., through appraisal, feedback on promotion and grant applications, mentoring). There is a **good sense of belonging among staff**.

We **promote research role models** through the website, noticeboards and representation in research seminars. The EDI team **advertises CPD offers**. Data shows good **engagement with courses**, especially by ECRs. Students report **having access to role models**. Our **commitment to EDI is also reflected in our research** which studies gender equality in education (Pekrun, Stoet) and academia (Sandstrom), cultural diversity (Geeraert) and how to increase BAME uptake of cancer screening (Orbell).

Our approach to REF management and output selection was **guided by the desire to provide a supportive research environment** while monitoring progress to assess success in allowing all staff to thrive. Annual monitoring exercises have identified potential barriers to progress and provided individual support. Final output selections were based on ratings from the Department REF2021 **reading group (gender-balanced, age varied)**. The resulting profile has, where possible, been assessed across relevant characteristics (e.g., the 60/40 male/female author submission split mirrors the Department's overall gender split).

Positive Research Culture

We aim to provide a culture that enables staff to perform at the highest standard and that values individual contributions and collaborations for research and impact activities. A collegial and supportive approach is a key underpinning pillar to our mission. We employ **different channels to communicate and share good practice, provide support, and celebrate staff success**: bi-weekly staff meetings and monthly newsletters cover grant and publication successes, CPD events and significant research findings. Termly Research Conversation sessions encourage staff to exchange information on key developments.

We host weekly research seminars featuring internal and external speakers (see Section 1). All seminars are scheduled during regular working hours (9am, 1pm, or 4pm) to **ensure a large proportion of staff can participate**. We invite staff, students and technical staff. The Department has strong links within the Faculty (e.g., CSEE, SHSC) and beyond (Language and Linguistics, Government, Sociology). Termly Faculty and University cross-disciplinary research seminars enhance the offer and **provide opportunities to form collaborations**: The Cross University Research Events series (launched in 2019), included ten psychology staff to address topics on Digital World, Environment, Behavioural Social Science, Brain and Mind, Food, Human Rights, Collective Systems, and COVID-19, demonstrating the breadth of our research expertise. Faculty seminars have included 18 psychology speakers since 2017. To further foster collaboration in an organic way, a number of **specialised journal, think tank, and research discussion clubs** are on offer (e.g., Interoception; Cognitive Neuroscience; Vision, R, MATLAB, Psytoolkit), all open to other departments.

Research Integrity

Research Integrity and quality are ensured through adherence to strict ethical guidelines. Staff and student research activities conform to the University's Research Integrity statement, Code of Good Research Practice and the principles set out in the 2019 **Concordat to Support Research Integrity**. The University **provides training to staff** who serve on the departmental ethics committee. The departmental Ethics Officer provides advice on the process, reports new developments and runs a dedicated webpage to support ethics applications. PGR students are taught about ethics and research integrity in a specialised research methods module. The Ethics Officer sits on one of the three University Ethics Sub-Committees. Our research ethics practices are informed by the BPS Code of Human Research Ethics.

3. Income, infrastructure and facilities

Income

Since REF2014, we have been awarded over £3.6M in competitive grant funding from a large portfolio (Section 1) for 70 projects. This figure contains a large number of projects which, while of relatively low financial value, have created strong links with a range of partners, and delivered value impact for them. Our long-term goal is to build on these successful partnerships in larger scale projects, that is **we aim to maintain a varied portfolio** and **to maximise success** by **strengthening inter- and cross-disciplinary research** through our theme approach and cross-faculty research collaborations.

The Department's funding strategy centres on securing funding for societally relevant projects. We have aimed to **increase collaborative and interdisciplinary research**: departmental **funding (£83k) has been prioritised for projects spanning traditional boundaries**. Several Away Days have focused on funding activities (e.g., competition to develop a group bid with the winner's bid receiving seed-corn funding) and improving the staff's skill set in this area. Staff are supported in their applications by DoR and DoI to increase success rates. In line with our mission to **strongly encourage work that leads to impact**, staff have very **successfully adapted** some of their research lines. **The shift is evidenced in securing competitive Impact Acceleration Account** (ESRC IAA) funding for seven projects since 2016, enabling impact with a broad range of organisations. The projects, valued at nearly £50,000 **ensure an impact pipeline for the Department's future**. Similarly, the **Department increased research projects focused on innovation** working with the University's Knowledge Exchange (KE) team who help draft applications and offer support in linking up with stakeholders. Recent projects have been funded by Research England (via Enabling Innovation: Research to Application Initiative (>£45,000)), Innovate UK (£140,000), Provide (£140,000), Oculus (>£55,000), Department for Transport (£15,000) and Cerium Visual Technologies (>£145,000).

Infrastructure and Facilities

Since REF2014, the Department has **reconfigured and updated existing facilities** at a total cost **of over £390k**. Staff have access to various specialist laboratories with the majority **housed in a purpose-built building** (opened in 2009). Laboratories have **state-of-the-art equipment** for social and cognitive (neuro)-science work. Facilities and labs are **managed by an experienced team** of technical support staff. Below, we detail **how researchers are supported** through facilities and access to participants. Strategic capital investment is provided centrally to help with maintenance and renewals.

1. In-house equipment

Neuromodulation work can be conducted with two **Transcranial Magnetic Stimulation** (TMS) systems. A stereotactic **image guidance system** facilitates positioning of TMS coils. An additional system supports stimulation in continuous or pulsed modes. Another state-of-the-art TMS **coil positioning system** is shared with CSEE. **Electrophysiological (EEG**) work is supported through

a 128-channel system, 4 x 64-channel systems (creates 2 x 128 channels), and a portable, field work compatible 64-channel system. Some **amplifiers are compatible with TMS** to stimulate brain areas while recording EEG. Staff have access to a wide variety of **specialised analyses software** and in-house expertise can create **custom made MATLAB scripts**. The Department has two 24-channel **near infrared systems** (creating one 48-channels system) and two 8x8-channel mobile systems for off-site research. Staff have the ability to perform hyper-scanning (e.g., parent/child) research. Staff can use 8 **eye-trackers** (head mounted; free-standing; portable; stationary) and 8 **virtual reality** headsets incorporating head, hand and eye-tracking capabilities. These are integrated with Optitrak motion capture facilities. **Specialised labs** include a **sexual studies** lab, an **observation room** equipped with video recording facilities, a **visual perception lab** with access to a telespectroradiometer; intuitive colorimeter; precision tints; optometric trial lenses; monochromator; photometers, autorefactor, and a range of clinical optometric test equipment. Auditory work benefits from two **psychoacoustic** hearing labs and three **double-walled soundproof** booths (including recording facilities). A **group testing suite** consists of multiple neighbouring cubicles, whose computers can be interlinked to allow real-time group behavioural studies. Papers reporting data using this specialised equipment are published in prestigious outlets: *Current Biology*; *Cortex*; *Human Brain Mapping*; *NeuroImage*. Over 50% of academic staff and their research students are regular, experienced users of the equipment, while others access neuroscience techniques through collaborations.

2. MRI scanning

The Department has started to develop **strong links to the psychology department at UEA** and supported their successful bids for an fMRI scanner. Submitted grant applications using fMRI facilities have received input from UEA's imaging team and collaborative projects have started (supported through Eastern Academic Research Consortium). Staff will have **prioritised imaging access** and the Department has negotiated **reduced access fees** for pilot work. **Structural imaging**, important for specialised TMS work, **is possible** at the local Colchester Hospital.

3. High Performance Computing (HPC)

HPC needs are supported by the University's cluster to help with resource intensive data analysis (e.g., imaging), computational time, and resource intensive computer modelling (e.g., deep learning).

4. ESSEXLab

Staff use the world-leading social science research laboratory which offers access to a diverse database of over 2,500 participants, 32 mobile lab devices for field research and sound proof partioning or one-way glass set-ups for group studies. ESSEXLab has supported field work (e.g., PGR student Lotun used mobile devices to collect data at a convention) and group testing (e.g., O'Gorman's work on community perceptions, in-and outgroup members, or social network positions). Staff secured >£5000 through ESSEXLab funding.

5. STEM building

The **£18m newly built STEM building** gives Faculty departments shared collaborative lab (e.g., 150-seat IT-rich space) and social space. It is part of an initiative to create a **dedicated science square**. The open-plan structure allows researchers to share and co-create ideas more easily (e.g., joint investigations started by Rigato/Filipetti and computer scientist Andreu-Perez; Paulmann and brain computer interface specialist Scherer). Staff use it to meet collaborators, businesses, and other partners.

6. Office Space

Most staff have individual offices and those who share offices do so because they wish to. All have access to a state-of-the-art PC which is upgraded regularly to ensure fast data processing times.

7. Participant recruitment

Online and in-lab participant recruitment is facilitated through SONA, **a cloud-based participant management software**, currently listing over 1,300 active participant volunteers from different socio-economic backgrounds and age groups from which to recruit.

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

Our direct mechanisms to promote stimulating, collaborative impact focussed research include **seed-corn funding for interdisciplinary work, theme meetings, seminars, termly Research Conversation sessions, and focused Away Days**. As part of our commitment to producing high quality research with longer-term returns to society, much of the collaborative work is widely disseminated and **researchers engage locally, nationally and internationally to deliver the benefits** of our mission. Exemplar collaborations summarised below **describe projects that transcend borders** and **collectively contribute to addressing our key mission**.

Essex Collaborations

Thinking about the World

Theme members collaborate on various topics: Juanchich's expertise on communication and Sirota's strengths on statistical reasoning resulted in joint work on **climate change communication** (e.g., in *Climate Change*) and **how health professionals communicate risk-related information** (e.g., in *Medical Decisions*). Buchanan and Russo (impact case) have focused on how individuals' environmental efforts can be enhanced. They received continuous funding from industry (e.g., Green Energy Options LTD; EIRA). **Decision-making and communication practice work is complemented by health behaviour research**: Orbell and Cooper studied how outdoor activities can lead to reduced PTSD symptoms. Their collaboration led to the first published formal evaluation (RCT) in this field, has received wide media coverage, led to a documentary film on life with PTSD and the programme has been adopted into the provision of the NHS. **These impacts demonstrate the end-user focussed research drive of the Department**. Similarly, Kennett's and Gillmeister's research on altered body image perception revealed **biomarkers of eating disorder symptoms** and benefits from multi-method approaches (behaviour, eye-tracking, EEG). Gillmeister and Rigato extend this to infant and toddler populations to explore body image (dis)satisfaction longitudinally (departmental seed-corn funded, published in *Developmental Psychology* and *Biological Psychology*). Holmboe and Rigato explored **longitudinal trajectories in brain function in infancy** (The Bill & Melinda Gates Foundation), aiming to enable an early identification of children with impairment. In short, **staff produce interconnected dimensions of research across this theme to enrich knowledge on motivated behaviour and reasoning**.

Interacting with the World

Several strong cross-disciplinary collaborations were facilitated by the Department through workshops and funding: a well-funded (Leverhulme Trust, IAA, from 2021 the Belgian Science Foundation), novel programme was developed by Paulmann and Weinstein on **motivational language** spanning infants, adolescents, adults and different cultural groups (e.g., published in *Journal of Experimental Social Psychology*; *Developmental Psychology*; *Social Cognitive Affective Neuroscience*), covered in various (inter)national media outlets. Rieger and Paulmann also **combine traditionally distinct fields**: they explore how sexual preference manifest at the voice level through secondary data analysis of Rieger's research funded by the American Institute of Bisexuality. Rieger also **successfully combines expertise** from Biological and Social Psychology with Orbell as evidenced in high-profile publications (e.g., *Psychological Science*). Cooper (Neuroscience) and Simpson (Developmental) looked at **(mental) well-being in youngsters**, directly **contributing to critical debates such as the impact of screen use on children's** mental health and attention (e.g., covered in BPS screen-use recommendations). Foulsham and

O'Gorman **unite cognitive and evolutionary psychology** questions in their work on **social hierarchy** (Department funded; published in *Evolution and Human Behaviour*, 2019; already 29 citations Google Scholar). More traditional collaborations between theme members of similar background also flourished in this REF period (e.g., Dawtry and Cozzolino's work on victim blaming published in *Personality and Social Psychology Bulletin*; Sandstrom's and Orbell's work on gender equality in *Personality and Social Psychology Review*). **Theme collaborations have directly benefited from methodological diversity and multi-disciplinary pursuit, cross-fertilising different research fields to further our understanding of social actions and interaction processes.**

Experiencing the World

Multi-method strengths include research in vision science (e.g., Dent and Cole; Dent and Foulsham; Hughes and Clarke; Hibbard and Van Dam): traditional work on **precision and accuracy** is complemented by investigations on **perception and behaviour in media** and cultural experiences (e.g., Psychology/Art History research on spectatorship published in *Leonardo*). Other work focusses on **psychological changes across the lifespan** with a strong focus on **work that directly benefits society**: Loaiza and Ward address **memory abilities in healthy ageing** populations; pioneering work showed that ageing does not have to be associated with memory decline (EPS funded, published in *Journal of Gerontology, Series B: Psychological Sciences and Social Sciences*), now followed up by researching strategies for ageing people to improve their memory. Younger generations are studied by combining behavioural (Simpson) and neurophysiological (Rigato, Filipetti, de Klerk, Sel) techniques to investigate infants' **psychological development** over time. Cross-disciplinary collaborations supported by the Department (Psychology/CSEE) **developed new tools and approaches for the discipline**. Examples include AI systems that can be combined with fNIRS data **to provide alternatives to fMRI data** collection which is not suitable for infants (published in *NeuroImage*). Critical mass exists for cutting-edge work on exploring **how interoception affects perception, cognition, and emotion**. Staff (Daughters, Filippetti, Gillmeister, Hughes, Klabunde, Korb, Sel, Valentini) from different backgrounds (social, cognitive, developmental, neuroscience) apply EEG, fNIRS, interventional techniques and behavioural measures to combine their varied skill set. Their collaborations on the relationship **between interoceptive processing and psychopathology** and the influence of **internal sensations on social behaviour** is funded by diverse sources (e.g., BIAL, British Academy, Guarantors of Brain) and regularly published in high-impact journals (e.g., *Cognition*; *Current Biology*; *Sleep*).

By stimulating open dialogue and encouraging staff to **engage beyond core research interests** and **by strongly promoting collaborative research activities** (e.g., promotion fund; publication fees support; shared labs), we have **brought together researchers** with diverse perspectives and skills sets.

International Collaborations

The Department has a large number of **international collaborations**. Since REF2014, **41.4% of our outputs originated through international collaborations**. Staff are **tightly connected to colleagues at elite universities** across the world. Since 2014, 384 publications were co-authored with researchers affiliated to institutions in the top 100 Times Higher Education (THE) ranking (2020), highlighting how **Essex researchers contribute globally**. For example, Klabunde collaborates with Reiss (Stanford; #2) on the neural correlates underlying interoceptive processes in clinical populations (e.g., Turner syndrome; Prader-Willi syndrome). Sandstrom's work on the benefits of communicating with strangers has led to collaborations with Boothyby (Cornell; #19) and Cooney (Harvard; #3) published in leading journals (e.g., *Psychological Science*). Rieger's longstanding collaborations with Bailey (Northwestern; #24) and Savin-Williams (Cornell; #19) on human sexuality has led to high profile publications in *PNAS* and *JPSP*. Loaiza's expertise in memory research has led to collaborations with Bartsch (Zurich; #73) and Lewis-Peacock (Texas; #44) published in distinguished outlets (e.g., *NeuroImage*; *Psychology and Aging*). Similarly, Ward collaborates with Zurich (e.g., Oberauer) emphasising the acknowledged strength of the unit's

memory research world-wide. Paulmann published with Pell (McGill, #40) on some of the most cited work on emotional prosody. Work on emotion in the classroom is produced by Pekrun with colleagues from McGill and LMU (#32). Cole's work on action understanding includes collaborations with Welsh (Toronto; #18). Hanley and Nozari (Johns Hopkins University; #12) investigate speech errors and speech production mechanisms. G Hughes has a long-term collaboration with van den Bussche (Leuven; #45) on action and cognitive control. Foulsham's vision research programme leverages long-term collaborations with Kingstone (British Columbia; #34).

We actively **support international research engagement** and exchange by providing **international research visitors** with desk space, library access, presentation opportunities and access to equipment and facilities. Visitors came from Australia (Wilson, Melbourne University, recipient of Essex visiting fellowship); Canada (Pell, McGill) the U.S. (Croft, University of Arizona, BA visiting fellowship; Ebert, Brandeis University; Elsner, Ohio State University, Essex visiting Fellowship); Korea (Lee, Yeungnam University); Spain (Vergara-Martinez, University of Valencia, Generalitat Valenciana funding); and Norway (Sjoberg, Kristiania University College) amongst others. As part of our **commitment to supporting the next generation** of psychology researchers, staff receive administrative and technical support to **host ERASMUS+** (Succi, University of Bologna; Hruska, Slovakia; Safarova, Czech Republic; Fiorentino, University of Pavia; Roos, Mid Sweden University; Orengul, Kadir Has University) or otherwise funded research **students from across the globe** (Bielefeld University; Shanghai International Studies University; University of Grenoble; Colorado State University; University Goettingen; University Konstanz; University Würzburg; Milan).

Our expertise is utilised in many **internationally funded research projects**: Lamarche collaborates with Murray (University of Buffalo SUNY) on an NSF (US$117,890) funded project which utilised the COVID-19 pandemic to test a transformative new theoretical model of trust and social cooperation. Rieger is a consultant on a Northshore University Health System project funded by the NIH (US$ 3,177,202) to research the genetic basis of female sexual orientation and female fluidity. Moreover, he is a consultant on Brotto's (University of BC) NSERC grant (CAN$200k) on physiological and psychological causes of asexuality. Sirota contributed to projects funded by the Spanish Ministry of Science (EUR 71k), Slovak Research and Development Agency (£180k) and the Research Council of Norway (£523k). ECR Hanel collaborated with Zarzeczna (Amsterdam) on how trustworthy information about COVID-19 is considered when provided by scientists as opposed to governments (Templeton Foundation; £20k). He also collaborates on internationally funded (National Council for Scientific and Technological Development, Brazil; European Association of Social Psychology; GCRF) political psychology projects. Paulmann and Vansteenkiste (Ghent) will soon start work on an FWO funded project (EUR250k) on motivational language use with children. Gutierrez-Sigut investigates with Baus (Pomeu Fabra) the neural underpinnings of learning sign language as a second language (Spanish Ministry of Science; EUR46k). Anna Hughes' expertise in image analysis is needed for a Czech Science Foundation (GACR; £350k) project led by Sulc (Institute of Vertebrate Biology). Together with Roth (Limerick), van Tilburg collaborates on a project on how a UK-Ireland border affects intergroup relations in Northern Ireland (European Association of Social Psychology) and with Chan (Hong Kong University), he investigates how people deal with boredom (funded by Hong Kong SAR Government, ~£53k). Collectively, these projects **are worth nearly £4 million** and demonstrate **how valuable the Department staff's research skills are internationally**.

Relationships with Key Research Users, Beneficiaries and Audiences and Impact

The **DoI ensures we support, engage and encourage research that translates into solutions for industry and society**. Impact is a standing agenda item on all RC meetings and Away Days focus on impact. Impact activities are included in promotion and probation criteria. **Engagement beyond the discipline** is a core focus of staff. The REO's Research Impact team helps staff to engage with partners, provides legal support (e.g., signing NDAs) and communicates opportunities (e.g., policy engagement). Since 2017, three staff members have received a University **Celebrating Excellence in Research and Impact Award** (Buchanan: ECR category; Wheeler:

PGR; Wilkins: Best international impact). Staff are regularly involved in **projects involving end-users**. For instance, Ward's work in the RECALL project (EU FP7), aimed to improve access to memories and looked at ways in which technology can improve understanding of memory, while the PACTMAN project (EPSRC) examined the role of consent, security trust and privacy in using technology. The research directly involved **the NHS and BBC**. One of the resulting publications (Cortis-Mack et al., 2017) is one of the **most downloaded papers** in the *Journal of Memory and Language*. Similarly, Loaiza's research on mentally holding information and working with information and how this impacts memory has **focussed on end-users**. Loaiza regularly **communicates her research findings** at public events (e.g., Café Scientifique, Pint of Science), and organises public focused events. Based on her **engagement with the public and beneficiaries**, she has been invited to sit on **the Board of Trustees for Age Concern**.

Vision research investigates attention in film and comics (e.g., in collaboration with Cohn, Tilburg University). International and industry partners (e.g., Facebook Reality Labs) are helping to **investigate new virtual reality experiences**, and our expertise in this area is **also benefitting creative industries in the UK** (e.g., Van Dam and Hibbard's work). Vision researchers work **with local and national art galleries and theatres** to ensure **wide applications** (e.g., usage of virtual reality in theatre). **Knowledge exchange projects** in this area have received funding from EIRA and have benefited from the Department's agility to form **outstanding teams with diverse skill sets** from within and outside the discipline. Recent examples include vision/AI focused projects (e.g., led by Hibbard and van Dam) which included contributions from language (Paulmann) and theatre (UoA 33) to **enhance research value to external** partners.

Departmental staff help **shape debates on educational issues**. Paulmann's work on prosody explores the role of **voice use in the classroom** and further attempts to investigate **the role of voice training in teachers' education** and continuing professional development. She **works directly with teachers, teacher training companies** (SCITT Essex Thames), and **voice trainers** (5Voices) to help outline ideal motivational communication strategies for teachers (ESRC IAA-funded). This work addresses calls from the **teacher agency**, **OFSTED**, and **Carter Review** for teachers to learn how to use voice effectively. Stoet's education work has made significant **contributions to the national and international debate on underrepresented gender groups** in secondary and tertiary education. It has been **covered in the news and internationally** in influential outlets. He has been **consulted for solutions** about the underrepresentation of girls by important institutions (e.g., **Department of Education**), **schools**, and **professional organisations** (e.g., Institute of Physics). This research is published in prestigious outlets including *PNAS*. Work by Pekrun similarly focuses on **under-representation**: his research contributes to understanding the role of emotions in diverse student populations (e.g., **gender differences**, different **cultural backgrounds** and students who **are at risk emotionally and economically**). His work helps understand why female students are emotionally disadvantaged in STEM disciplines. Pekrun contributed to international large-scale assessments such as the **OECD's Program for International Student Assessment (PISA)** which evaluates high school students' educational attainment in countries across the world. In recent PISA cycles, the scales he developed (e.g., Achievement Emotions Questionnaire; Epistemic Emotion Scales) were used in over 70 OECD and non-OECD countries with more than 500,000 students per assessment. He is a **member of the Senior Advisory Board for the OECD PISA 2021 Framework** (2018-2021). Pekrun's work has substantial implications for classroom practices, which have been made **available to practitioners and the wider public** through various outlets (e.g., monograph *Emotion at School*, Taylor and Francis, 2017) and his 2014 booklet *Emotions and Learning* was distributed worldwide by the **UNESCO International Bureau of Education** and the **International Academy of Education**.

Other examples of **research with end-users in mind** include Russo, Rolison and Buchanan's research funded by Innovate UK and Provide (~£558k) focused on designing, testing and implementing an **AI driven automatic triaging system for musculoskeletal referrals**. They investigated how acceptability of such systems can be increased. Buchanan's **expertise on usability and acceptability of products** also led to consultancy work for Green Energy Options LTD (in-home display survey; impact case). Similarly, Wilkin's KTP with **Cerium Visual**

Technologies led to a subsequent licensing deal which resulted in royalties totalling ~£27k so far. The developed colorimeter is **used world-wide to help optometrists prescribe precision tinted lenses to help those suffering from visual stress** (impact case).

Impact case studies were directly supported through a number of routes: **PVC-R funding** (~£30k) supported impact case study developments. The University **paid for legal costs to file a patent and supported the secondment of staff. Essex UK Data Archive provided data** used for research in one of the impact cases. The **REO Research Impact Team** helped catalogue evidence and supported drafting case studies. The Department has **prioritised** impact case authors when bidding **for publication fee funds and included** impact activities in the **workload model**.

We strongly focus on **outreach activity** to contribute to a more scientifically literate and informed society that can critically assess research and have confidence in its experts: we have launched a **pod-cast series** (Understanding our Place in the World) that highlights our research to a wider audience. Staff participate in local (e.g., Café Scientifique) and national (e.g., Pint of Science; ESRC Festival of Social Science) **events** to communicate latest research findings; they **demonstrate experimental methods** (e.g., eye-tracking; EEG) in public places such as **museums or art galleries**; they frequently contribute to **mainstream outlets** (e.g., *The Conversation*); present to **special end users** (e.g., Age Concern, Pensioners Group, Veterans, Teachers, charities); engage with **schools and colleges**; and have presence in **national and international media** (print, radio, TV).

Staff from all themes share links to **external bodies in the health sector**: NHS (Cooper, Daughters, Orbell), ESNEFT (Rigato, Orbell), NIHR Research Design Service and NIHR East of England ARC Prevention and Early Detection in Health and Social Care (Klabunde), Provide (Buchanan, Russo, Rolison), including **health focussed charities**: Suffolk Mind (Hibbard), Walnut Tree Health and Wellbeing CIC, Combat Stress, Help for Heroes, The Angling Trust, Sport England, Active Essex, Community 360 (Cooper); Essex Respite and Care Association (Barry); The European Pain Federation (Valentini); Campaign to End, St Helena Hospice, Cruse Bereavement, Marie Curie and Essex Cancer Research (Sandstrom). We also work with the **transportation sector**: Docklands Light Railway (Roberts) Department for Transport (Rolison); and **education sector**: Educational Testing Service, OECD/PISA, Bavarian and Mexican Ministry for Education (Pekrun). We work with **charities focussed on young and old age** including Age UK (Loaiza), Age Concern Colchester and Northeast Essex (Lamarche); National Childbirth Trust (de Klerk); and **charities focussed on language**: British Dyslexia Association (Hanley), We Love Reading (Lisi). Other strong links include: American Institute of Bisexuality (Rieger), The Commonland (Hanel) and QuinetiQ (Hughes). **Industry links** include Facebook Reality Labs, Matthew Linley Creative Projects (Hibbard, Van Dam); Auduro Communications (Poerio); Beat Eating Disorders, Unreal (Gillmeister); Royal Deaf Association (Gutierrez); 5Voices, Verenigma (Paulmann); Green Energy Options, Centre for Sustainable Energy (Buchanan); Monsenso (Pekrun). These links support direct impact from our research and will help to secure funding for research and impact in the future.

Staff are **board members, trustees, or scientific advisors** on a number of different organisations including: **National Cancer Research** Network Primary Care Clinical Sciences Development Group (Orbell); **AgeUK** (Loaiza); **BabyBrains** (Rigoto, Filipetti); Essex **Respite and Care Association** (Barry); **PISA 2021** (Pekrun).

Contribution to the Discipline

All staff undertake **regular grant application reviewing**. **Nationally**, they reviewed for Arthritis Research UK, BBSRC, British Academy, Cancer Research UK, Department of Health, ESRC; GCRF, Leverhulme Trust, MRC, NHS dissemination centre, Nuffield Foundation, Pain Relief Foundation, The Waterloo Foundation and Wellcome Trust. **Internationally**, staff reviewed for Austrian Science Fund, Canadian Institutes of Health Research, European Research Council, European Science Foundation, Flanders Institute, French National Research Agency, Fundacion

La Caixa (Spain), FWO (Belgium), Genesis Oncology Trust of New Zealand, German Research Foundation, Israel Science Foundation, National Science Centre Poland, National Institutes of Health (USA), National Science Foundation (USA), Natural Sciences and Engineering Research Council (Canada), NWO (Netherlands), Research Grants Council of Hong Kong, Slovak Research Agency, Social Sciences and Humanities Research Council of Canada, Studienstiftung des Deutschen Volkes (Germany), Swiss National Science Foundation, Templeton World Charity Foundation, The Portuguese Foundation for Science and Technology, United States - Israel Binational Science Foundation and Volkswagen Foundation (Germany). All staff **peer-review for leading journals** in their discipline.

Since REF2014, staff have had **editorial board membership** of leading journals including: *Anxiety, Stress and Coping*; *Attention, Perception, and Psychophysics*; *Cognition*; *Cognitive Science*; *Contemporary Educational Psychology*; *Educational Psychologist*; *Educational Research Review*; *European Journal of Psychology of Education*; *Frontiers in Psychology*; *Journal of Eye Movement Research*; *Journal of Experimental Psychology: Human Performance and Perception*; *Journal of Behavioural Decision-making*; *Journal of Cognition*; *Journal of Cognitive Psychology*; *Journal of Educational Psychology*; *Metacognition and Learning*; *Neuroscience & Biobehavioral Reviews*.

Staff **organised conferences and workshops at Essex** including British Association for Cognitive Neuroscience (Cooper); EU workshops (Ward); Binocular Vision: Challenges and Techniques (EPSRC; Hibbard); 1st UK Culture & Psychology Mini Conference (Geeraert); 70 Years of Attachment Research: A Multidisciplinary Social Neuroscience Perspective (Vrticka); Bodily and Cognitive Selves Workshop (Valentini); Babybrains workshops for parents (Rigato and Filipetti).

Many staff are **widely recognised for their excellence in research** in their field: collectively, staff gave **28 invited keynotes** at (inter)national conferences. Yamaguchi received the **APA Earl Alluisis Award** for early career achievement (2016). Hibbard received **a mid-career Fellowship from the British Academy** to explore 3D vision in natural complex scenes. Sandstom is an elected **fellow of the Society for Experimental Social Psyc**hology. Loaiza received the **best paper award** from *Journal of Cognitive Psychology* (2015). Pekrun received the 2017 **Sylvia Scribner Award** of Division C, AERA, which honours a research programme that has 'significantly influenced thinking and research in the field of learning and instruction'. He received the **EARLI Oeuvre Award** 2017 which recognises the lifetime achievement of a researcher who contributed ground-breaking work across a broad range of fields in research on education. He received the **John G. Diefenbaker Award** (Canada Council for the Arts), **Lifetime Achievement Aw**ard 2018 (German Psychological Society) and **Outstanding International Collaboration Award** 2017 (SIG Technology, Instruction, Cognition, and Learning of the AERA).