

Institution: Liverpool Hope University
Unit of Assessment: Psychology, Psychiatry and Neuroscience (A4)
1. Unit context and structure, research and impact strategy

UoA4 at Liverpool Hope consists of 13 colleagues specializing in psychological research. In particular, we seek breadth and depth in the areas of vision and cognition, developmental, and social and applied psychology. The goal for colleagues in the Unit is to conduct, publish and disseminate theoretically motivated, empirically rigorous psychological research that has relevance to the real world.

Research and Impact Strategy

Since REF2014 we have refined our research strategy to focus on three factors. The first element of the strategy focuses on infrastructure and resulted from recognition of the need to make a major investment in the research infrastructure at Hope supporting the Human Sciences. This investment was made in 2016 with a £14m spend on a new building that served, in part, to house our dedicated laboratory facilities (specific resources are detailed in Section 3). The second element of the strategy focuses on recruitment and has resulted in recruiting new colleagues to work alongside those already in post. Recruitment of new colleagues was guided by an analysis of existing strengths in the UoA, alongside a rethinking of the kinds of psychological research that should flourish at Liverpool Hope given its size and institutional mission. The third element of our strategy focuses on career development and the development of colleagues' skills through mentorship and training.

The outcome of the second part of the strategy is that the UoA is now composed of three research groups (Vision and Cognition, Developmental Psychology, Social and Applied Psychology) each led by a senior academic. The research groups are as constituted as follows:

Vision and Cognition Group: Led by Professor Donnelly (recruited from University of Southampton in 2018). Members: Clark, Harrison, Palumbo, Paramei and Yue. Also contributing to the group are Davies and Jones (both on Teaching and Scholarship contracts). Colleagues in the Vision and Cognition group have particular interests in colour and face perception, motor control, spatial navigation, visual search, and aesthetic preferences.

Developmental Psychology Group: Led by Associate Professor Hadwin (recruited from University of Southampton in 2020) and Lopez-Perez (formerly Plymouth University). Members: Gallagher-Mitchell and Zuffiano (formerly University of Toronto). Also contributing to the group are Bourke, Stack and Oztop who are being returned in the Education UoA. Colleagues in the Developmental Psychology group have particular interests in the development of behavioural, cognitive, social and emotional functioning conducive to wellbeing. These issues are explored in typically developing children, adolescents, and those with developmental delays or mental health conditions.

Social and Applied Psychology Group: Led by Professor Ferguson. Members: Binks, Ferguson, O'Sullivan. Also contributing to the group are Cousins (returned in Allied Health) and McGeough and McCagh (Teaching and Scholarship contracts). Colleagues in the Social and Applied Psychology group have particular interests in personal and social identity, health and wellbeing, and peace, conflict and justice.

The research groups provide a forum for focussed discussion, feedback (e.g., on presentations, manuscripts and research proposals) and collegial support through regular meetings. Research groups are outward facing with an expectation that they work with others to enable multi- and interdisciplinary research. In addition, members of research groups are expected to encourage academics from elsewhere to visit Hope and to foster wide academic networks. Furthermore, and consistent with the mission of Liverpool Hope University for a positive impact of our research in the lives of real people, research groups are expected to establish and maintain links to stakeholders for whom the translation of research into practice is important. These links are especially critical in terms of ensuring research from the UoA has impact. Examples of successful translation of research into practice include Ferguson's work on terrorism for the Home Office, Paramei's work on clinical decision-making in colour vision science, and Donnelly's work for the Defence and Security Accelerator, the Ministry of Defence and the Department for Transport/Manchester Airport (further evidence to support these statements is detailed in Section 4).

The third element of our strategy is to develop the skills of all colleagues through mentorship and training. In addition to the recent senior appointment made within the UoA, we have also made a Visiting Professor (Professor David Canter) and an Honorary Professor (Professor Kyle Cave [University of Massachusetts]). Senior colleagues play an important role in internal review processes for enhancing grant applications and papers and in focusing junior careers towards long-term programmatic research. The expectation is that all colleagues, but especially junior and mid-career colleagues, will benefit from mentorship such that the likelihood of developing a substantial and sustained research career is increased. Evidence of the success of our approach to mentorship can be found in emerging projects of shared interest (e.g. Jones' work with Cave and Donnelly on the role of glucose and iron on mechanisms of guided attention). Further details of mentoring and support are described in the Staffing Strategy [Section 2].

In sum, we have pursued a research strategy since REF 2014 that has led to a step-change in research facilities, a sharpened focus on three key areas of research, and mechanisms to develop colleagues to achieve their very best. The strategy is simple, sustainable and appropriate for the context offered at Liverpool Hope University for supporting and delivering high-quality psychological research. Evidence that the strategy is working can be found in the production of high quality research outputs (by for example Donnelly on visual search; Harrison on prosthetic limb control; Lopez-Perez and Zuffiano on the effects of prosocial behaviour on well-being, Ferguson on radicalisation) and by the successful translation of research into impact beyond academia (for example Paramei's work on colour vision across the lifespan, Lopez-Perez and Zuffiano's work on emotion regulation, well-being and educational attainment, and Palumbo, Harrison and Donnelly's work on spectatorship of art).

Future Aims and Goals

The UoA is an emerging area of research strength at Liverpool Hope University. The recent developments outlined above have set the UoA on a path of growth and maturation. The UoA Research Committee is charged with monitoring, evaluating and developing psychological research and impact. It is formed from the Head of Psychology, the REF unit coordinator, senior representation from each of the three research groups and representation from early career colleagues. The committee is charged with implementing, reviewing, adapting and monitoring all aspects of our research and impact strategy and advising on expenditure in relation to research

infrastructure. In doing so the Research Committee has a fundamental influence on the performance and future direction of the UoA.

The Research Committee is planning for growth in staffing to make best use of existing facilities, and has a significant role in guiding recruitment of new colleagues as the UoA grows. We plan for modest growth in both academic and technical staffing, some of which has already been achieved after the REF census date [e.g. Santiesteban (Vision and Cognition group), Lingwood (Developmental group), Di Lemma (Social and Applied group)]. Future growth will accord with our existing plans. However, we will make a concerted effort to recruit to areas linking with complementary ones within the University. By building up teams of researchers we will increase our capacity to produce high-quality psychological science that explores fundamental and applied issues alongside increasing our understanding of the opportunities for impact.

In sum, the future goals of the Research Committee in relation to managing growth are (1) to increase our capacity to develop and enhance deep disciplinary knowledge alongside the ability to conduct multi- and inter-disciplinary work. We will do so by minimising the intellectual distance between colleagues within and between research groups and by strengthening of links between colleagues in different UoAs at Liverpool Hope with joint posts and matching posts between UoAs with complementary interests; and (2) to enhance our ability to develop academic and translational research networks such that the opportunities for impact can be fully realised. In doing so, growth will reflect a maturation of the UoA at Hope and so be associated with further improvement in the quality and quantity of publications and impact, growing research income and research impact.

Particular importance is attached to growing the Developmental and Social and Applied Psychology research groups. There are significant opportunities for these groups to grow and align themselves to other parts of the University, given its specific ethos and tradition. Specifically, the UoA will further foster interests in mental health and well-being, and strengthen the link to education through developmental research, and build up experimental social psychology with specific reference to understanding issues of self, identity and health.

Challenges

The Research Committee has identified four further challenges that are to be worked on. The first is to grow the postgraduate research community. We consider developing the postgraduate research community as fundamental to delivering a sustainable research environment. In light of this fact, we have recently (from 2020) changed our postgraduate teaching provision to stimulate postgraduate research activity. In order to facilitate growth, and to add to the recruitment of self-funding students, a funding mechanism has been discussed with the PVC Research that allows future PGT recruitment to link to the offering of PGR bursaries in a scaled and sustainable manner. Our goal is to recruit 3 PGR students per annum to a minimum steady state of 9 PGRs. We have already identified an income stream to support the potential growth in academic staff (2 per annum) and PGRs (2 funded bursaries per annum) between 2020 and 2023.

The second challenge identified by the Research Committee is to support colleagues in operating within the principles of Open Science. We have already made progress in supporting colleagues to develop and enhance their work in a manner consistent with the principles of open science. Forty per-cent of colleagues lodge data (e.g. Uccelli, Palumbo, Harrison, and Bruno, *International Journal of Psychophysiology*, 2019, <https://osf.io/yvsg5/>), stimuli (e.g. Bertamini, Rampone, Wright, Makin and Palumbo 2016, *Cerebral Cortex* <https://osf.io/jgp7d/>) or syntax (e.g. Alessandri,

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Zuffiano and Perinelli 2017, <https://www.frontiersin.org/articles/10.3389/fpsyg.2017.00223/full#supplementary-material> with >28K viewings) within the Open Science Framework (or equivalent). Some have pre-registered studies prior to publication (e.g. Paramei, Cognition, 2020, <https://osf.io/5m4h7>), and others are involved in the public dissemination of science (e.g. through Science Week and bespoke public science engagements [for example, at TATE Liverpool]). We have also authored new UG and PGT provision to include Open Science on the curriculum (e.g. programming in PsychoPy and uploading experiments to Pavlovia (an open source experimental programmes site for which we have purchased an annual licence), and pre-registration of studies) to begin to foster Open Science practices in our students. We will increase the proportion of colleagues engaged in activities supporting Open Science through an on-going programme of staff development seminars and mentoring [see Section 2].

The third challenge is to ensure future progress is considered in relation to assuring maintenance to our shared values for the UoA of fairness and inclusivity. In Section 2 ('Support and promotion of equality, diversity and inclusion [EDI]') we detail how awareness of EDI has influenced all aspects of our working practice and we explain the steps the UoA has taken to instil a culture of openness, support and opportunity in relation to EDI with the goal of ensuring equal opportunity for everyone and that voices from protected groups are heard.

The fourth challenge, exemplified by the challenge of conducting research during the COVID-19 pandemic, is to invest further in online methods of data acquisition (beyond Qualtrics and Pavlovia and online psychometric tools, for example) such that the quality of the virtual research infrastructure matches that of the physical infrastructure. We acknowledge the need to invest in staff development to take best advantage of online research tools and are investing to help colleagues build their skill set.

Summary

In sum, the UoA has recently benefitted from a substantial infrastructure investment and a simple and clear research and impact strategy that focuses on building teams of like-minded researchers exploring related issues. This investment and strategy has resulted in high quality programmatic impactful research (for example Paramei's work on colour vision across the lifespan, Lopez-Perez and Zuffiano's work on the effects of pro-social behaviour on well-being, and Ferguson's work on terrorism). The future goals to be achieved are clear, as is the path to achieving them.

2. People**Staffing strategy**

The UoA has a staffing strategy designed to meet objectives set by its research and impact strategy, alongside the requirement of the University to deliver teaching. The strategy must be understood in light of two key objectives: to recruit the very best academics that will help achieve our strategic goals and to develop the academics already in post to be able to perform as best as possible (through building skills and networks). In addition, we seek to achieve these objectives while fostering a spirit of equality and inclusivity across all colleagues within the UoA.

Recruitment

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We have recruited both younger colleagues with the ability to mature into fine researchers (since REF 2014: Drs Clark, Bruno, Jones, Lopez-Perez, O'Sullivan, Palumbo, Spape, Yankouskaya, Yue, Zuffiano; and Santiesteban, Lingwood, Di Lemma after the census period), alongside more experienced colleagues (since REF 2014: Professor Donnelly [Head of the Department of Psychology], Associate Professor Hadwin), as determined by the needs of the research groups. The senior appointments have been made in experimental cognitive psychology (Donnelly) and developmental psychology (Hadwin) to enhance leadership within these areas (see Section 1). The junior appointments have been made on the basis of evidence of quality and likely future trajectory alongside fit to our key areas of research.

Mentoring and development

All colleagues conducting independent research have one third of their workload allocated to doing so. The quality (and quantity) of research, research publications, funding and impact that results from this allocation of time is recorded in an online form and considered by the Head of Department along with the research group heads. Their collective view forms a basis for issues discussed at appraisal and performance review when considering each individual's contribution to helping to deliver the research strategy (see Section 1).

Appraisal and performance review meetings occur annually, unless there is felt to be a need to hold an interim meeting. The Head of Department conducts all appraisal and performance reviews. The meetings are framed as an open and honest reflection on progress by both appraisee and appraiser. The appraisee is encouraged to evaluate the long-term trajectory of their research activities, and the outcome of the meetings is a set of defined expectations for the forthcoming year. While expectations are set individually, some elements are reasonably standard, for example producing at least two research outputs per year and submitting one grant application. Expectations are set in order to help colleagues keep focus on delivering high quality and impactful science while having to meet other competing objectives.

Meeting expectations that may be challenging requires that the UoA puts in place opportunities for colleagues to develop their skills through mentoring and peer-to-peer learning. The importance of investment in mentoring was noted in Section 1, and the research groups provide a vehicle for peer-to-peer learning. Evidence of the success of our approach to mentorship can be found in emerging projects of shared interest (e.g. Palumbo and Harrison's work with Donnelly on the spectatorship of artworks at TATE Liverpool).

Where either appraisal and performance review or mentoring identifies a case where some investment would be beneficial to colleagues then there are earmarked funds available from the Research committee to which an application for support can be made. Financial support is available for publishing in open access journals (e.g. funding was provided for Harrison [Frontiers in Human Neuroscience] and Ferguson [Frontiers in Psychology]), for attendance at national and international conferences (e.g. Paramei: European Conference on Visual Perception, Trieste, Italy, 2017; Harrison: Visual Science of Art, Leuven, Belgium, 2019) and for developing networks [e.g. Lopez-Perez and Zuffiano, Children's Emotional Development and Wellbeing workshop, June 2019]. Funding support is also available for the initial development, acceleration and refinement of activities to translate research into impact [e.g. Palumbo: Seeing it with the expert's eye: empowering the public to engage with artworks] and to support the improvement of technical, analytic and other skills [e.g. Pennington's attendance at Psychopy, MatLab and R courses]. In addition, colleagues in the UoA benefit from short sabbaticals (referred to as Consolidated

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Research Time [CRT]). CRT allows colleagues the opportunity to step back from other responsibilities to focus on research. Recent examples of the use of CRT are Gallagher-Mitchell's visit in 2019 to Purdue University and Paramei's visit in 2019 to Erlangen University (this visit was support by an award from the Humboldt Foundation) and Ferguson's visit in 2014 to the University of Maryland (this visit was funded by a Fulbright award).

We extend research mentorship and peer-to-peer arrangements to all colleagues. Colleagues committed to developing as independent researchers can apply for a generous allocation of research time to support their progression. The allocation of research time for Teaching and Scholarship colleagues is contingent on an explicit mentorship plan and can extend to up to 33% of workload. In this specific case, the arrangements have been transformative for those carrying a high teaching or administrative load but seeking to progress to a balanced academic pathway (e.g. Davies).

There is clear emerging evidence of the benefits of investing time and effort into developing mentorship and peer-to-peer support within the UoA. There is evidence in: (1) the significant career progression of junior colleagues joining Liverpool Hope since REF2014 that result from enhanced (i.e. better publications) and extended research activities (e.g. high profile public science events); (2) the achievements of mid-career staff in terms of increased expectations leading to high-impact publications (e.g. Paramei: Cognition, in press), funding (e.g. Ferguson's 2020 Fulbright award) and a significant contribution to the impact agenda (see the Impact Case Studies associated with this submission); (3) colleagues who do not yet fulfil the criteria for independent researchers are showing significant progress to doing so (e.g. Davies: i-Perception, 2017; Reading and Writing, 2019; McCagh, British Journal of Clinical Psychology, 2019).

Postgraduate Research (PGR) Students

We consider PGR students to be very early career but full members of our academic community. All PGRs have dedicated office and computer facilities and are located close to academic colleagues and laboratory facilities.

All PGR students have a Director of Studies who is their primary supervisor. A Director of Studies is an experienced academic with a track record of at least 3 successful co-supervisions of PGRs to completion. Students also have a co-supervisor who provides supervision alongside the Director of Studies. In addition, and if deemed of benefit, an external advisor can also be added to the supervisory team (e.g. Mestry [Bournemouth University] is part of the supervisory team for Smillie). Supervisory teams are designed with the project in mind rather than to reflect particular research group. Supervisors from different disciplines are brought together to form a team to supervise interdisciplinary theses (e.g. Parr's thesis 'Evaluating and alleviating the cognitive burden associated with upper-limb prosthetic hand control' was supervised by Harrison along with Professor Khayat (UoA Allied Health Professions, Dentistry, Nursing and Pharmacy)).

The goal of the supervisory team is to provide the best possible advice to the student, within the context of their emerging thesis and broader career. The supervisory team takes on the mentoring role with respect to the student. Mentoring of PGR students can often lead to the identification of a training need. Training needs identified as requiring external assistance are funded and arranged. For example, the UoA has arranged for Bailey to attend training courses in R (University of Southampton), and in using EyeLink and Experiment Builder (UCLan).

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Supervisory teams are charged with ensuring PGR students make a broader contribution to the research environment of the UoA. PGR students are expected to present their research at research group meetings where they receive informal feedback. They are also expected to present work at national and international conferences, as appropriate, in the later years of their studies (e.g. Johnen: Conference of the European Society for Cognitive Psychology, 2017, Potsdam, Germany). They apply for support for these activities from the Research Committee to enable them to do so. PGR students are also expected to train others (both staff and students) in specific technical and analytical skills gained while conducting their research.

Student progress is reviewed annually through a monitoring review by a panel chaired by the Director of Postgraduate Studies on their way to completion. The quality of PGR students (and supervision) is attested by the fact that completed PGR students are employed as research fellows (e.g. at the University of East Anglia (Johnen) and Liverpool John Moores University (Parr)).

We are focussed on contributing to the sustainability of research by producing an increasing number of well-rounded PGR students, some of whom will progress in academia (see Section 1: Future aims). Consistent with our view of PGR students as very early career researchers who may aspire to join academia, those who wish it can have a modest role in providing support to teaching within the UoA working in support of more experienced academics. If they elect to do so then they are trained to develop the appropriate skill sets. PGRs are limited in their role in teaching in line with RCUK guidelines. In addition, all PGR students undertake a Research Skills Programme (RSP) to develop key employability skills.

Support and promotion of equality, diversity and inclusion (EDI)

It is important to Liverpool Hope University that research goals are achieved while both promoting and supporting diversity. Only if EDI is both promoted and supported will our efforts to give all colleagues the opportunity to produce high quality, impactful, research progress be sustainable and their impact have longevity. Awareness of EDI has informed all aspects of our practice from re-thinking the new research-informed curricula to recruiting, developing and managing colleagues and in how we think about the membership of research groups and the academic committees supporting research. The UoA has taken clear steps in embedding a culture of openness, support and opportunity in relation to EDI such that voices from protected groups are heard.

The UoA has made a number of steps since REF2014 to address EDI, especially in relation to female staff members in leadership positions within research groups (e.g. Lopez-Perez and Hadwin). The UoA has led events at British Science Week focusing on the Role of Women in Science and Society (BSW, 2018). It also supports female colleagues attending the Leadership Foundation Aurora Programme (McCagh). The outcome of these measures is confidence that we are making good progress in working to address the historic barriers to academic career progression for women. The relatively modest size of the UoA at Liverpool Hope makes it difficult for us to evidence a similar approach to that used for gender with respect to other protected characteristics.

Supporting EDI is embedded into our practice and supporting it is the responsibility of all colleagues. Colleagues within the UoA must complete appropriate training (e.g. Equality and Diversity, Mental Health Awareness) and are encouraged to join EDI-related networks (e.g. Women's network) and participate in data capturing exercises (e.g. Stress Audit, Mental Health Survey at University, UoA or Union level) that help in improving our approach to EDI issues. The

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UoA is, nevertheless, mindful of the need to be alert to complacency. To ensure we work according to best practice, the UoA has an EDI lead (currently Gallagher-Mitchell). The EDI lead has a formal responsibility for ensuring open dialogue (through provision of information [through dedicated online noticeboards facilitating the circulation of relevant research], monitoring our practice and progress and reporting to committees within the UoA [standing agenda item at all formal meetings]) on EDI issues.

Many of the practices laid out above in Mentoring and Development (Section 2: Mentoring and Development) were designed with EDI in mind. Following these practices is important for all colleagues, including those coming into academia from non-traditional routes. The UoA views mentorship as a key mechanism in effective development and progression for all staff, and follows the Vitae Research Development Framework, as part of our institutional membership. The UoA subscribes to the principles of recognised frameworks (e.g. Mindful Employer, Inclusive Employer) to embed an inclusive and effective culture of support systems for all staff experiencing periods of change or personal challenge. We have a culture of openness to disclosure of personal barriers which may be impacting the momentum or maintenance of an individual's research career trajectory.

The UoA has a package of support measures available to colleagues who have had career breaks (e.g. parental leave, significant illness) through adjustments in workload, KIT days, use of consolidated research leave and access to internal funding streams [see Section 2: Staff Development] that are tailored to support colleagues in meeting their short, medium and long-term research goals.

3. Income, infrastructure and facilities

Income

The UoA supports research through a set of linked funding mechanisms. Research is supported through the direct allocation of QR income from the University to the UoA. This income is used to support workload allocation for all colleagues (the workload model provides a $\frac{1}{3}$ workload allocation for all those conducting independent research), the development and maintenance of research infrastructure and equipment, support for research-related activities (e.g. conference attendance and other marginal costs), and bursaries for PGR students. While our grant income is currently modest, the UoA also benefits from a reallocation of overhead income from grant and other awards. $\frac{2}{3}$ of all overhead income is returned to the UoA for discretionary spending on supporting research.

Infrastructure

The UoA continues to benefit from the £14 million investment in the new Health Sciences Building. The building houses the majority of the state-of-the-art research facilities for the three research groups in the UoA, and there is a substantial amount of laboratory space dedicated to the exploration of the human sciences including psychology. The laboratories were constructed to meet existing needs and the likely needs of new colleagues joining the University with a specific interest in psychology (see Section 1: Future plans).

The Vision and Cognition group has a suite of bespoke Colour, Electrophysiology, and Eye-tracking laboratories. The Colour Vision Laboratory (22m²) has equipment for measuring colour sensitivity, including ViSaGe (Cambridge Research Systems Ltd.) with the Cambridge Colour Test,

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Colour Assessment and Diagnosis (CAD) test, Heidelberg Multi-Colour Anomaloscope, Farnsworth Colour Vision Tests 15d and 15 hue desaturated tests, ColourCal Colorimeter (Cambridge Research Systems), Munsell Book of Color Volumes 1 & 2, 2 x CRT Monitors for stimulus presentation, Ishihara Plates, and daylight booth for use with colour measurement tools. The colour vision laboratory has directly enabled Paramei's research on colour vision (in particular colour vision across the lifespan) which has led to recent major publications (e.g. in *Cognition* and the *Journal of the Optical Society of America*) and the impact case study detailing how this research is used in clinical decision-making.

The Electrophysiology Laboratory consists of two purpose-built spaces covering 50m². The first space houses two 64-channel Biosemi electroencephalogram (EEG) systems with active electrodes. The second houses a Biopac functional near infrared spectroscopy (fNIRS) imaging system with forehead sensors and high spec dedicated PCs running COBI fNIRS software (Biopac). The Biosemi system also includes a galvanic skin response probe, and a plethysmograph. Data analysis is supported by Matlab and BESA software. Thought Technology equipment is available for measuring physiological responses, with Biograph Infiniti software for setup and analysis. The electrophysiology equipment is linked to computers running with E-Prime, PsychoPy and Python programming tools. The EEG lab has enabled Harrison's ERP studies on motor control during prosthetic arm movement and the effects of anticipations during emotion processing, Palumbo's work on curvature, and Jones's work on gluco-regulation.

The Electrophysiology Laboratory has recently been extended to include virtual and augmented reality equipment (Pico Neo 2 Eye, Microsoft Hololens 2, Lynx Lynx-R1) linked to a portable EEG system (Epoc Flex Saline Sensor Kit, Emotiv Pro Plus Software). This new investment provides an additional laboratory designed to facilitate research with colleagues (e.g. Reid) in Computer Science and Informatics who share an interest in neural responses to real and virtual visual environments.

The Eye-tracking laboratory (9m²) is equipped with an EyeLink 1000 system (SR Research), using Experiment Builder and EyeLink Data Viewer Software and is set up to be used in conjunction with standard and widescreen computer monitors. It also houses an Applied Science Laboratories Mobile Eye XG gaze registration system, and a wireless Tobii mobile eye-tracker (Tobii Pro Glasses 2, 100 Hz premium package) with associated Microsoft Surface tablet and Tobii Pro Lab analysis software. The Vision and Cognition Laboratory also benefits from a licence-sharing agreement with the NorthWest Vision and Cognition group and SR Research that significantly increases the number of licences available to us for laboratory-based eye-tracking research. Beyond enabling many studies, the mobile eye-tracking equipment has been critical in allowing Liverpool Hope (in conjunction with Dr Trawinski at New York University and Dr Kass at Parsons School of Design, New York) to work on a large-scale public science project with TATE Liverpool..

Through agreement with Health Sciences, colleagues in the Vision and Cognition group have access to two other laboratories. The Human Movement laboratory includes an 8 camera Motion Capture System (Vicon, USA), TMS (2002, Magstim, UK) arranged around a sizeable floor space that is required for the high-fidelity recording and analysis of human movement through space. The Human Nutrition Laboratory provides 8 booths with dedicated PCs allied to facilities for testing physiological factors that influence vision and cognition. These facilities include testing facilities for Hb1AC (Affinion 2, Allere, UK), Lipid profile (Cholestech, Allere, UK), and blood glucose measurement (C-Line Sport, Biosen, Germany). Linking the eye movement and Health Sciences

facilities together allows for exploration of the role of nutritional factors on the effectiveness of real world searching that colleagues at Liverpool Hope are conducting with Professor Cave (University of Massachusetts) and Professor Wenger (University of Oklahoma).

The Developmental group has a suite of laboratories that come together to form the Developmental Laboratory (known as ChildLab). The Developmental Laboratory is a suite of three interlinked rooms, housing an observation lab (7m²), interview/testing lab (7m²) and a parent/play lab (20m²). The suite has been furnished and decorated to be a suitable environment for small children. Video recording in the Developmental Laboratory is supported by Concept Pro AHD DDVR Recorder with 1TB HDD, Concept Pro Controller, 2 Iiyama monitors, 4 fixed motion sensitive cameras, 2 x Phonic AM240 Mic /Line 4-Stereo Input Compact Mixer, Samsung 28" TV Monitor, and Clearview PaceNet Digital Video Recorder. These facilities have been critical in enabling dissertation students' research which have led to peer-reviewed publications (e.g. Patel, López-Perez, & Zuffiano, accepted; Journal for the Study of Education and Development) as well as for pilot studies that have resulted in grants (e.g. Oztop PI & Lopez-Perez CO-I; Creativity in children; £2,000 funded by Ruth B. Noller Foundation in March 2020), and in enabling research on key themes within the group, such as interpersonal emotion regulation.

The Developmental group also conducts research in the community. This is enabled using portable video and sound recording equipment, a set of tablet PCs and laptops, and Empatica wrist-worn bracelets to measure physiological responses together with Kubios analysis software enable this work. These facilities for collecting physiological data offsite in schools is critical to Zuffiano's Templeton Religion Trust funded study on how government and educators influence the value-systems of young citizens, Lopez-Perez and Zuffiano's British Academy funded study on the effects of prosocial behaviour on well-being, and Hadwin's long standing work on anxiety in school settings.

The Social and Applied group has Transcription and Groupwork laboratories. The Transcription Laboratory (10 m²) has a suite of dedicated PCs along with Olympus transcription kits, digital video recorders, telephone recording facilities, Sennheiser headphones and language analysis software (CLAN, LIWC 2015) for transcribing and coding qualitative data. The Transcription laboratory is treated as a secure space that allows for secure storage of hard copies of electronic and paper data within a dedicated safe. The additional security is required given our storage of sensitive interview material (See Ferguson's work for the Home Office and outlined in the Impact Case Study: See Section 4) and other data (see Donnelly's work for the Defence and Security Accelerator, the Ministry of Defence and the Department for Transport/Manchester Airport: see Section 4).

The Social and Applied group Groupwork laboratory is shared with the School of Social Sciences and is housed outside of the main Health Sciences building. The facility was refurbished in 2019 and is composed of two adjoining rooms with video observation facilities and widescreen monitors. While the above facilities are designed for the specific needs of the research groups, laboratories are managed by a dedicated technical officer (Pennington) working alongside two other technicians (Wells and Pickering) who manage the facilities through a laboratory user's group (chaired by Dr Amirabdolliahan) reporting directly to the UoA.

All colleagues within the UoA have access to generic facilities provided in addition to the specialised facilities designed for specific groups. There is a suite of 10 acoustically dampened

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testing cubicles (with their own dedicated 15m2 waiting area) for the running of computer-based experiments. Each booth is equipped with a PC, E-prime 2 Professional (E-prime is available for programming on all office computers for staff and in computer lab rooms for students) and PsychoPy, along with image processing software for stimulus generation and editing. We also hold a resource bank of Psychological Tests. The resource bank holds in excess of 300 psychological tests, questionnaires and scales (e.g. WAIS III, WMS III, Dyslexia Screener). To assist in the gathering of data from questionnaires colleagues have access to JISC Online Surveys, Qualtrics and a set of iPads for use in research studies.

The UoA has an equipment and maintenance budget designed to ensure key facilities remain fit-for-purpose. The last two years have seen a major overhaul of computers in the general access laboratories, and investment in new eye-tracking and physiology equipment (new Biosemi EEG amplifier and Tobii Pro Glasses). The average investment in updating major items of equipment in the laboratories is c£40K per annum.

We manage access to human participants in two ways. Participation by undergraduate students in studies is managed through SONA. Participation in experimental studies is a required part of the undergraduate curriculum. It is not only for colleagues in the UoA to access sufficient participants for empirical studies that participation is a required part of the curriculum, but also to help ensure that students gain an understanding of how psychological science is conducted.

Some studies however, and in particular those where there is an increased potential for impact, require access to specific communities of participants. For example, studies conducted on specific topics (including interviews of political figures relating to conflict), and those requiring access to sensitive 'big' data (e.g. Donnelly's x-ray screening project using real-time screener data) are managed outside of the Participant Pool by the Research Groups working under specific guidance (e.g. Ministry of Defence Research Ethics Committee, [ModRec]). Through experience acquired over years, Ferguson and Donnelly have specific skills in working with ModRec to support the development of studies of this kind and their expertise is disseminated to others as appropriate. The Developmental research group has specific partnerships with multiple primary (e.g. Lady Bishop Eton, Childwall Church of England, St Paschal Baylon, King's College, Springwood, St Anthony of Padua) and secondary schools (Blue Coat, Liverpool College, St Hilda, Fazakerley, King David) in Liverpool and beyond in relation to Lopez-Perez's cross-cultural work.

Finally, risk assessments and ethics are managed by dedicated UoA leads. Leads for risk assessment and ethics work to ensure that all research conducted within the UoA accords with the highest standards. We recognise that our research culture must embody the values of ethics, good practice and scientific and professional integrity, so that others can have trust and confidence in the methods and the findings of our research. We view our commitment to Open Research practices (see Section 1) as an important way in which we can ensure this trust and confidence.

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

Research collaborations, networks and partnerships, including relationships with key research users, beneficiaries or audiences

Section 1 outlined that the UoA has a strategic goal for research groups to form research collaborations, networks and partnerships, and to liaise with research users, beneficiaries and other audiences. The mechanisms through which the UoA explicitly supports colleagues in achieving this goal were outlined in Section 2. Fostering these relationships is important both for producing high quality research and also as they underpin our efforts to ensure that our research has a route to impact.

The result of valuing and fostering academic links between the UoA and colleagues external to the University is the formation of local, regional, national, and international collaborations, networks and partnerships. A count of the universities that colleagues in the UoA have co-authored published papers with in the period of the REF shows an average of over 5 active collaborations with other Universities per FTE returned in the submission. Of these collaborations, we have active collaborations with over 30 Universities in the UK and over 40 Universities (distributed across 16 countries) beyond the UK. Major research collaborations, networks and partnerships for each research group are described below.

The Vision and Cognition group has published with colleagues across the UK (e.g. Aberdeen, Bournemouth, Cambridge, Central Lancashire, Exeter, Glasgow, Liverpool, Liverpool John Moores, Nottingham, Nottingham Trent, Southampton, University College London) and elsewhere (e.g. Belgium [Leuven], the Netherlands [Radboud], Sweden [Gothenburg], Germany [Magdeburg] USA [Oklahoma, Amherst, New York], Brazil [São Paulo, Paraíba], Italy [Verona, Florence], Japan [Joshi], Switzerland [Lausanne], New Zealand [Massey], Russia [Moscow, Smolensk]). Memoranda of understanding underpin the links with the University of Florence under the Erasmus+ and Erasmus Traineeship Programmes. These academic links are reinforced locally by engagement with the NorthWest Visual Cognition group (a British Psychological Society supported network of colleagues from Liverpool Hope along with Salford University, University of Central Lancashire, Edge Hill University that is an emerging virtual centre of excellence for eye movement research in Vision and Cognition; (<https://northwestvisualcog.wixsite.com/nwvc>) and the Liverpool Neuroscience Group (along with University of Liverpool, Liverpool John Moores University, and Universities and NHS Foundation Trusts).

The importance of liaising with research users, beneficiaries and other audiences was a core part of our research strategy as described in Section 1, and the ways in which the UoA enables colleagues to fulfil this goal were outlined in Section 2. Some of these relationships are explained in detail in the impact case studies that form a part of this submission. However, our relationships with research users, beneficiaries and audiences extend well beyond those reported in the case studies. In summary, the UoA has produced research that has benefitted users by applying vision and cognition research (to clinical decision-making in colour vision science (see Impact Case Study by Prof. Paramei), regulation of x-ray baggage search, the public's detection of threat, and the public's understanding of the spectatorship of visual art), developmental research (to enhancing pro-social behaviour, emotion regulation, well-being and educational attainment), and Social and Applied Psychology (see Impact Case Study by Prof. Ferguson on terrorism). Our relationships with research users, beneficiaries or audiences are outlined in more detail below.

Links to other stakeholders enrich the academic mission of the Vision and Cognition Research group. Donnelly's work on visual search has influenced regulation of X-ray baggage screener working in the UK and EU and how to engage the public as agents of their own safety following the Manchester arena bombing in 2016. The various projects involve working in partnership with the

Unit-level environment template (REF5b)

Department for Transport and the Manchester Airport Group (e.g. Donnelly, Project Title: X-ray baggage search time on task) and the Defence and Security Accelerator (e.g. 'We're in this together: applying visual perception research to the search for threats in public spaces'). The projects build on longstanding relationships with government (through the Defence, Science and Technology laboratories (Dstl), The Home Office and Centre for the Protection of National Infrastructure [CPNI]). A second example illustrating our commitment to the dissemination of psychological science to the public is Palumbo, Harrison, and Donnelly's work on spectatorship in visual art which underpinned a two-week in situ event and a separate public workshop on Spectatorship of Art at TATE Liverpool. A third example is Palumbo's work on visual aesthetics in conjunction with Autism Together (<https://www.autismtogether.co.uk/> [Palumbo]), which explores the design of residential care homes of Autism Together [findings reported at the International Association for the study of Empirical Aesthetics (2018, Toronto) and at VPDVP (2019, Liverpool)].

The Developmental group has published research with colleagues from other universities across the UK (e.g. Universities of Plymouth, Cambridge, Edge Hill, Ulster, Oxford, University College London, Liverpool John Moores) and elsewhere (e.g. France [Lille], Spain [Madrid], Italy [Rome, Naples], the Netherlands [Leiden, Tilburg], Canada [Toronto], Israel [Jerusalem], the US [Texas, Arizona, Harvard], Romania [Cluj], Poland [Warsaw], Mexico [Guadalajara]). Memoranda of understanding underpin some of these links (with the Université de Lille and Sapienza University of Rome). The group has received 15 Erasmus+ trainees from different European universities and 2 visiting PhD students since REF2014 through these links. The group has also recently hosted 4 interns through the Nuffield Foundation placement program.

Links to other stakeholders enrich the academic mission of the Developmental group. In conjunction with the large network of schools (see Section 3), they have links with specialist education providers (e.g. Nature to Nurture Ltd, Flurish Education (this research was featured on the BBC programme 'Inside Out North West' in 2018), BeingMe Scotland, Assess Education), community organisations (a partnership with Lego and This Dan Can, exploring pro-social behaviour and fatherhood), software application developers (APPA Scotland Ltd [supported by a Knowledge Exchange Partnership award], EmoDiscovery), educational psychology services (Aberdeenshire and Hampshire Educational Psychology Department) and child and mental health services (Southampton CAMHS).

The Social and Applied group has published research with colleagues from other universities across the UK (e.g. Liverpool, Liverpool John Moores, Huddersfield, Bournemouth, Staffordshire, Royal Holloway, Stirling, Bristol, Queens Belfast, Birmingham and Oxford Brookes) and elsewhere (e.g. USA [Missouri], Canada [Laurentian], Australia [Queensland], Sweden [Lund], the Netherlands [Amsterdam], Israel [Open University]). While all links are valued, of particular importance are Professor Ferguson's research fellowship at the Changing Character of War Programme at Oxford University and his Fulbright Scholarship awardee researching at the National Consortium for the Study of Terrorism and Responses to terrorism (START), University of Maryland. These academic links are reinforced locally by membership of the Archbishop Tutu Centre for War and Peace at Liverpool Hope University.

Links to other stakeholders also reflect the academic mission of the Social and Applied group. Binks and Gordon (Staffordshire) are collaborating with veterans' groups in the North West (North West Veterans Association, Everton in the Community, Veterans HQ, Sam's Hub, Veterans in Sefton, and Military Community Services) to assess their needs and the services offered to them.

Unit-level environment template (REF5b)

O'Sullivan's work on mental health had led to connections with Jane Corbett, Assistant Mayor for Liverpool & Mayoral Lead on Fairness & Tackling Poverty, and together they raise awareness of the impact of welfare reform on mental health. Ferguson's research on radicalization and de-radicalization has led to engagement with government, police, military and intelligence stakeholders in the UK, EU and USA. In 2018 Ferguson hosted a workshop with the Home Office and US military and intelligence stakeholders, while the BBC (2014) created a web-based learning resource based on his research to educate people about the radicalisation process using Northern Ireland as an example of how civilians can get drawn into armed groups.

Wider activities and contributions to the research base, economy and society

The Vision and Cognition group organised and hosted the BPS cognitive section conference (2018) and the 2019 Visual Properties Driving Visual Preference (VPDVP) meeting. The Developmental Research Group organised the 2016 international conference of the European Association of Research in Learning and Instruction (EARLI) Special Interest Group (SIG 12), preceded by the European Literacy Network (ELN) Research Training School, a summer school in Research Methods in Behavioural Sciences (July, 2017: participants from Chile, Canada, Italy, Spain, Finland, Netherlands, and UK), an invited workshop on Children's Emotional Development and Wellbeing (June, 2019), also attended by practitioners and local school teachers. The Social and Applied Group co-organised the Mental Health and Welfare Reform conference in Liverpool in 2016 that highlighted the work of grassroots community networks such as Disabled People Against the Cuts, Mental Health Resistance Network, and Recovery in the Bin.

Colleagues hold, or have held during the REF period, visiting positions at several other universities: the University of Verona (Paramei), University of Oxford (Ferguson), University of Southampton (Donnelly, Hadwin) and The Hebrew University of Jerusalem, Israel (Lopez-Perez). Colleagues currently hold editorial positions at Sage Open (Lopez-Perez), Child Development, Developmental Psychology, Canadian Journal of Behavioral Science and Frontiers in Psychology (Zuffiano), PLoS One and Frontiers in Human Neuroscience (Harrison), Political Psychology, the Journal of Moral Education, the Journal for Deradicalization, and the Journal of Social and Political Psychology (Ferguson). Dr Hadwin has accepted the offer to become a joint editor on a new journal – JCPP Advances, to be launched in spring 2021. Professor Ferguson sits on the governing council of the International Society of Political Psychology. Colleagues have delivered keynote talks during the REF period at Progress in Colour Studies 2020 (Paramei), China Eye Movement Conference, 2016 and 2018 (Donnelly), International Conference on Psychoeducation, 2018 (Lopez-Perez), Society for Terrorism Research, 2018 (Ferguson). Colleagues have been involved in grant application reviews both in the UK (British Academy; ESRC; Medical Research Council) and abroad (Research councils in the Netherlands and Austria; National Science Center, Poland). Colleagues in the UoA are active members of academic societies (e.g. Clark: member of BPS Cognitive Section Committee; Paramei: Co-Chair of the Language of Colour Study Group of the International Colour Association; Lopez-Perez & Zuffiano: members of the European Association of Developmental Psychology).

Colleagues have also been involved in various advisory roles. Professor Ferguson has been an academic advisor and de-radicalization programme reviewer for the Office for Security and Counter Terrorism (OSCT) at the UK Home Office, and provided expert research advice to Dutch Ministry of Health, Welfare and Sports, The Northern Ireland Office and the Police Service for Northern Ireland (PSNI) on resilience and radicalization. He has also worked with the British Council in Pakistan to promote non-violence and challenge the acceptance of violence. Professor

Donnelly showcased his DASA-funded research to senior government officials (February 2019) to evidence the value of the Home Office Behavioural Science programme to government.

The University hosts an annual public 'Science Week' which reflects a broader commitment to the public understanding of science. During Science Week, colleagues within the unit inform pupils from local schools and colleges, together with other members of the general public, about our facilities and research findings. We offer a programme of talks from colleagues, PhD students, and external speakers (e.g. Dr Simon Duff, University of Nottingham) highlighting the applications and benefits of psychological research in the real world.

A core aspect of our Research and Impact strategy described in Section 1 is the recognition of the importance of delivering the best possible psychological science and of seeking to develop avenues in which to make our research impactful. It is equally important to us to show the value of psychological science to the public. Throughout Section 4 we have described various projects, activities, and events where the results of our psychological research have been disseminated to benefit society beyond the University.