

Institution: University of Nottingham

Unit of Assessment: UoA4 - Psychology, Psychiatry and Neuroscience

a. Context

The common drivers for impact across the unit of assessment are to influence the broader understanding and treatment of the interactions between brain, body, health and behaviour; to inform, educate and engage beneficiaries through the targeted dissemination of research and innovations with the aim of improving the perception, treatment and safeguarding of human behaviour.

The research of this unit impacts on a wide range of beneficiaries including UK government departments, national and international policy-makers, the National Health Service (general practitioners, clinicians, and patients), industry and members of the local community. The research and expertise in the unit from basic psychology to direct patient contact and product development is reflected in a far reaching range of impacts including: changes in guidelines, healthcare practice, global and national policies, public understanding of science and commerce. The unit comprises researchers from the: School of Psychology (SoP); Division of Psychiatry (DoP); Nottingham Hearing Biomedical Research Unit (NH BRU) and MRC Institute of Hearing Research (MRC IHR). These are independent research departments that collaborate on areas of common interest.

National and International Clinical Guidelines

The DoP brings together psychiatrists and applied psychologists who work closely with national and international industries, healthcare services, policy-makers and governments, with particular impacts on national and international clinical guidelines. For example, researchers have influenced key national clinical guidelines for stroke, changing the way in which stroke is assessed and treated (see **case study on stroke rehabilitation**) and have set up a national body of researchers and clinicians working directly with stroke patients to facilitate these changes, demonstrating how applied healthcare research in the unit has directly influenced patient care. The Cochrane Schizophrenia Group (CSzG) has built efficient systems that allow training, reviewing, dissemination, maintenance, and feeding of local, national and international healthcare guidance into appropriate treatments for schizophrenia. It maintains 200 reviews, all published with input from the CSzG Editorial Base. CSzG publications have been used extensively in guidance issued by the Scottish Intercollegiate Guidelines Network, NICE and WHO. Based on research in the unit, DoP staff have also co-authored the *Caring for tomorrow: EFCNI White Paper on Maternal and Newborn Health and Aftercare Services*, launched at the EU parliament in 2011, highlighting the need for the provision of emotional support for parents of infants born very preterm. In addition, obesity research has informed recent guidelines for UK Midwives and Health Visitors (www.ihv.org.uk/)

Healthcare

A key focus of the DoP is the translation of research to clinical populations, through guideline and health policy changes. A notable example is research on the severity and negative impact of psychological symptoms on Medically Unexplained Symptoms (MUS). The work led to the introduction of improved treatments for MUS in primary care in England through a £100M p.a. UK government investment in an Improving Access to Psychological Treatment (IAPT) pathway to reduce waiting times and allow patients more efficient access to treatments. The development of the 'Nottingham Tool' has also informed General Practitioners about rapid identification of MUS (see **case study on Medically Unexplained Symptoms**).

Global and national policy change

Global influence on government-level policy decisions is exemplified by work conducted with the Department for Transport (DfT) by the Accident Research Unit (ARU) within the SoP (see **case study on Road Safety Policy**). By identifying many of the primary causes for road traffic accidents, ARU research has influenced road safety policy in Europe, America and Australia. For example, research showing that low-level roadside advertising impaired drivers' attention to hazards has directly resulted in changes to advertising display policy in the USA, Australia and Europe. Furthermore, ARU research has also been used for effective national campaigns to

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educate the public about motorcycle collisions (THINK Biker!).

Increased public knowledge through community engagement

An important aim of the unit is to engage the public in science. Translating research for the public, in particular children, can be challenging. Led by the SoP, researchers from across the unit have established ongoing links with the local community through successful and innovative public engagement events (see '**Summer Scientist**' case study). Running annually since 2007, this event has increased public understanding of psychological research and stimulated interest in psychology and child development topics in the media. It has contributed to increased attendance at other science and research-based events in the local area. Importantly, it has fostered collaborations between members across the unit and created public impact development opportunities for postgraduate researchers.

New commercial opportunities in the UK and China

The unit has extended its research impact into commercial product development for healthcare. Established in 2008 with NIHR funding, the NH BRU is the only BRU focusing on translational research in deafness and hearing problems and collaborates with the MRC IHR at the interface of basic and clinical research. Its research led to an innovative solution to reduce unpleasant levels of noise in MRI scanners (Optoacoustic noise-cancelling headphones) that has attracted worldwide orders (see **case study on reducing noise during MRI**). A further outcome from MRI research was a spin-out company producing biosoftware for MRI data analysis in the UK (Ilix Ltd). In addition, the Python-based Psychology software (PsychoPy) developed in the SoP, has attracted end-user investment (Cambridge Research Systems).

Drawing on the University's and unit's international profile (especially in China) and as a result of a long-term collaboration with the Shanghai Mental Health Centre, the CSzG group launched an innovative start-up (Systematic Reviews Solutions) spanning both UK and China to address a market need for efficient and accessible training for, and translation of, Cochrane methods in China. Since 2009, demand for its training courses has doubled and these are currently held in Beijing, Shanghai and Ningbo. This exemplifies how University of Nottingham research can stimulate new markets and generate commercial success (see **case study on Systematic Review Solutions**).

b. Approach to impact

In order to bring about changes in the perception and treatment of human behaviour, the unit has developed and implemented a multi-faceted approach to identify and maximise impact from its research.

Identifying potential impact

The unit, through its constituent departments, has adopted a variety of approaches to help staff consider and explore possible impacts from their work. The SoP's Annual Review Meetings with staff (held since 2008) to discuss strategic research output have also helped staff identify, realise and monitor potential impact from their research. The DoP runs 'impact' workshops with support from the University's Communications team. Many members of the DoP are investigators in the £17M NIHR-funded Collaboration for Leadership in Applied Health Research and Care (CLAHRC) programme (2008-present) for Nottinghamshire, Derbyshire, Lincolnshire to accelerate the implementation of clinical research for patient benefit. The CLAHRC carries out high-quality applied research that translates into improvements in routine healthcare practice, focusing on Mental Health, Children and Young People, Primary Care, and Stroke Rehabilitation. NH BRU adopts mechanisms to remove barriers to innovation including: maximising connectivity with end-users in the life science business, medical and healthcare sectors through the membership-based Medilink East Midlands organisation (www.medilinkem.com); and through an agreement for sharing intellectual property between the University, Nottingham University Hospitals NHS Trust (via its Research & Innovation team) and the MRC to facilitate collaborative research with MRC IHR and NH BRU. Within the reporting period, five confidentiality and one material transfer agreements with external partners have been put in place to support routes to impact.

Departmental and institutional support for knowledge exchange:

Since 2008, the SoP has operated a pump-priming scheme to support and strengthen research

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that results in a variety of outcomes including grant applications, public engagement, high quality research output and wider impact. The scheme supported the underpinning research for Summer Scientist Week (SSW) between 2008 and 2010, supplemented by a doubling of the broader financial support for the activity between 2007 and 2012 and securing additional institutional and external funding for staff and student interns. The institutional funding linked SSW student internships to the University's Nottingham Advantage Award – designed to increase students employability – embedding SSW within institutional support for public engagement and outreach through the 'Impact: The Nottingham Campaign'. Dr Alastair Smith, one of the leads on SSW, secured a HEIF-funded Hermes Fellowship to support the outreach work. In the DoP, Steps to Active Kids, a targeted physical activity programme developed and evaluated with NIHR funding, has been introduced in schools in Nottinghamshire, Derbyshire and Lincolnshire and has also obtained a 6-month HEIF Hermes Fellowship to support further implementation of the programme. In other areas, SRIF (infrastructure) funding of £1.3M established the Nottingham Integrated Transport and Environmental Simulator transport research facility in order to facilitate applied driving research with the DfT. The University Business Engagement and Innovation Services team provide frequent presentations to the unit's staff in order to explore avenues to impact through end-user engagement, knowledge exchange, business partnership and the commercialisation of intellectual property. With their help, SoP researchers have recently secured a £170k TSB-funded Knowledge Transfer Partnership to accelerate the implementation of pedagogical tools in schools.

Engaging with potential beneficiaries:

Engaging with the public: For SSW, families from the local community were recruited through advertisements in magazines, newspapers, event listings, posters and flyers, generating a database of more than 1000 families. Ongoing contact is maintained with this participant base through communication of SSW activities and other University and public engagement events. The SoP is supportive of public engagement, providing financial and administrative support for school visits and national science events such as the British Science Festival (2011) and Big Bang Fair (2013).

Engaging with patients: MRC IHR and NH BRU maintain databases of potential research participants, each with more than 1000 entries. Contact is maintained through a regular newsletter. The NH BRU is supported by a Patient and Public Engagement expert, while MRC IHR receives support from the central MRC communications team. Researchers at the MRC IHR and NH BRU utilise mainstream media to reach out to potential participants - a primetime BBC profile of tinnitus research in 2010 resulted in more than 400 requests from the public to join the database. MRC IHR and CLAHRC directors are members of the NH BRU Partnership Strategy Board, facilitating early identification of impact opportunities to collaborate and work towards mutual benefit.

Engaging directly with end-users: User-informed research often provides a vehicle for impact. The DfT commissioned research on road safety exemplifies this. The SoP holds regular meetings with potential commercial beneficiaries such as Unilever, facilitated by institutional mechanisms. The DoP holds a number of joint studentships with the Nottinghamshire Healthcare NHS Trust. The CSzG has been working with the Department of Health's Healthcare Systems Planning Support Programme by developing a tool to assist the commissioning of value-based population health. The ARU are a member of the Ministry of Defence Science and Technology Laboratory's 'Tower of Excellence', enabling links from applied research to end-users.

c. Strategy and plans

Building on existing successful approaches (e.g. pump-priming), the strategy of the unit is to encourage and promote 'impact' within departments and across the unit as a whole, strengthening a culture where research and impact is synonymous.

The SoP will continue to develop and broaden their existing mechanisms for maximising and recognising the importance of impact from research carried out by its staff. From 2013, annual research 'away-days' will contain 'pathways to impact' group discussions and team exercises similar to those previously employed for research strategy and planning. Individual Annual Research Reviews, that include impact-focussed discussions, will involve the School's Impact Officer and Senior Research Support Officer to explore avenues for engaging potential beneficiaries. In addition, the School has a silver Athena SWAN award and is actively working towards Gold. The Athena committee advocates for female members of staff and is due to

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introduce a grant and impact mentoring scheme to support equal opportunities for research impact.

Across the wider unit, knowledge exchange funding mechanisms such as Hermes and from the Research Councils (e.g. EPSRC Impact Acceleration Account) will be extensively promoted. proactive engagement with end-users and other beneficiaries will be considered in work-load allocation and financial support will continue to be provided for staff to establish links with business and other activities designed to facilitate impact. Applications for study leave will also include a weighting towards those aiming to develop new or existing opportunities for impact. Biennial impact workshops will be held within each Department and a working group will investigate ways in which members across the unit might collaborate to extend impact.

The unit will utilise the University's new Knowledge Exchange Framework, governed by Knowledge Exchange Board, to help create a culture that encourages knowledge exchange, expanding engagement with businesses and key stakeholder groups, particularly in Asia. With the help of the Business Engagement and Innovation Services and Communication and Marketing teams, the research of the unit will be brought to the attention of potential end-users and beneficiaries.

The University and NH BRU will utilise membership of the East Midlands Academic Health Science Network (EM-AHSN) to help achieve its vision of transforming patient access, experience and outcomes at the earliest opportunity through the initiation, adoption, spread and diffusion of innovation and best evidence. It provides a mechanism to grow an integrated commercial offering for the NHS from development to procurement by deepening the engagement of Medilink EM. NH BRU and MRC IHR biannual scientific meetings with research staff and scientific strategy meetings with senior research leads will increase the focus on identifying and exploiting potential impact.

d. Relationship to case studies

Increasing Public Engagement and Involvement with Psychological Research Through the Creation of 'Summer Scientist' Events. The unit's approach is exemplified by its support of the SSW public engagement event. Having identified the potential impact of SSW at research review meetings, the event was supported financially and administratively, making use of School and Institutional level mechanisms. The SoP pump-priming scheme supported the underpinning research, granting £9.5k to key researchers between 2008 and 2010. Support was doubled between 2007 and 2012 and key organisers' administrative duties were offset. The recruitment of student interns for SSW was boosted at institutional level by linking the internships to the Nottingham Advantage Award. The University's Impact Campaign Team provided backing through advice and assistance with publicity, communications, marketing design and podcasts.

Influence on National and International Road Safety Policy. Some impact was user-led in the first instance, such as the work commissioned by the DfT to investigate road safety. This research demonstrates the symbiotic nature of the collaboration with some research being requested by the DfT with further research feeding back into DfT policy-making. In addition, this research has benefitted from institutional distribution of infrastructure (SRIF) funding that allowed the building of the ARU transport research facility, underpinning the motorcycle strand of this impact. The SoP also funded specialist research staff.

Adoption of new engineering solutions to reduce the patient experience of intense acoustic noise during Magnetic Resonance Imaging. A prime example of researchers actively engaging with beneficiaries is demonstrated by the MRC IHR and NH BRU who approached an Israeli company (Optoacoustics Ltd) due to their previous development of MRI-compatible audio technology. Working through MRC Technology (the MRC technology transfer agent responsible for translating scientific discoveries into commercial products), the software and hardware technologies were licensed to Optoacoustics Ltd to enable commercial realisation.

The development of the China-based company 'Systematic Review Solutions' and enhanced knowledge of evidence-based medicine. Along similar lines, to address a different problem in healthcare, the development of Systematic Review Solutions shows innovation in its methodologies and also the University's commitment to foster talent and innovation in its early career researchers. This company was supported from its inception by senior staff from CSzG, providing expertise, consultation and authority showing the unique translation of knowledge to a profitable business and the creation of a new Asian market.