

<p>Institution: Liverpool John Moores University</p>
<p>Unit of Assessment: Allied Health Professions, Dentistry, Nursing and Pharmacy</p>
<p>a. Context</p> <p>Fundamental to our philosophy in undertaking applied scientific research, is our engagement with stakeholders from the beginning of the research process to the dissemination, uptake and utilisation of our findings to provide the intelligence, tools and infrastructure to improve human health. Our research portfolio is multidisciplinary and includes both applied and fundamental research. In all areas we promote the completion and recording of impact and engage with a broad set of users and beneficiaries reflecting the research and knowledge transfer activities of the two research units: 1) Laboratory Based Health Sciences and 2) Public Health and Promotion.</p> <p>The non-academic users and commissioners of our research are diverse and include government departments and bodies at national and international levels. We have research contracts with the World Health Organization (WHO); Department of Health (DH); Home Office (HO); Quality Control North West (QCNW); and Department for Food, Environment and Rural Affairs (DEFRA). We have long standing partnerships with significant policy and advisory bodies including: the European Commission (EC), European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), European Chemicals Agency, European Medicines Agency (EMA), Health Canada, Medicines and Healthcare Regulatory Agency (MHRA) and United States Environmental Protection Agency. We collaborate with, and our research is used by multi-national industrial partners in the chemical, pharmaceutical, cosmetics and personal care industries; for example, Astra Zeneca, Boots, Colorcon, Compass Minerals, Eli Lilly, GlaxoSmithKline, Mast Diagnostics, Quest Vitamins Ltd, Unilever and Wakunaga of America Co. Ltd. Research is often based upon formal partnerships with the health and social care sector and we have memorandums of understanding, based on a model developed for the Department of Health and the NHS R&D Forum, with local hospitals and health trusts (e.g. Alder Hey, NHS Halton & St Helens and The Walton Centre) ensuring effective and efficient governance of research affecting both organisations. Our researchers have positions on advisory boards and groups (e.g. British Sociological Association's Working Group on Alcohol, European Chemicals Bureau, Liverpool Mayor's Task Group, NHS Disease Prevention Panel, The Chief Medical Officers Working Group on Alcohol, and UK Advisory Council on the Misuse of Drugs) promoting knowledge transfer, informing guidance, encouraging collaboration and facilitating the timely dissemination and application of our findings. Our beneficiaries and audiences extend to the general public including patients, families and consumers.</p> <p>The type of impact generated from our research is varied. Our applied scientific research has contributed to the improvement of existing industrial products and processes (Unilever, Qualicaps Europe, Salt Union, Qarshi Industries Ltd) and in procedures for the storage of drugs within the NHS (Royal Liverpool University Hospital [RLUH] and Marie Curie Palliative Care Institute Liverpool). Our research has enabled industry to comply with new EU directives regarding the testing of chemicals and cosmetics on animals (see REF3b). The pharmaceutical industry has benefited, for example, from research that informed the establishment of new regulations for trace metals detection and limits in pharmaceutical formulations and this has influenced policy decisions of the Rational Implementation of the ICH Q3D regulations committee. Public health research has provided the intelligence and infrastructure to reduce mortality and morbidity and inequalities in health and improve community safety and wellbeing, for example, evidence-based changes in legislation (EC and UK Government) and influencing and informing guidance and policy development (DH, HO, MHRA, National Institute for Health and Care Excellence (NICE), Public Health England (PHE), Public Health Wales and EMA).</p>
<p>b. Approach to impact</p> <p>The main mechanisms employed by this UoA to translate research into impact are outlined below;</p> <p>Approach 1: Collaboration with industry and the health service to capture end user requirements at the research planning stage. Much of our research is a two way relationship whereby we provide solutions to improve health and also work with stakeholders to identify key strategic problems and develop appropriate research agendas. The Centre for Public Health (CPH) has been a WHO Collaborating Centre for Violence Prevention since 2007; leading, supporting and disseminating research on violence to increase capacity to prevent violence and reduce the impact it has on people's health. The collaborating Centre also feeds directly into policy generating a global impact. Since 2008, in response to the needs of NICE, CPH have completed nine</p>

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systematic reviews, contributing to evidence to inform guidance for practitioners and health professionals on, for example, hepatitis B and C (PH43), and needle and syringe provision (PH18). Collaborative research with Sefton PCT and community pharmacy networks on the UK yellow card scheme for reporting adverse drug reactions (ADRs) has impacted on amendments to EU legislation (January 2012) which now include a requirement for patients to be able to report ADRs through a pharmacovigilance system involving them in their own healthcare. In collaboration with clinicians at the RLUH a study to support an extension to the shelf life of monoclonal antibodies has led to a reduction in wastage and cost for the NHS and enabled the RLUH to support two large clinical trials for cancer treatment. We form part of the Medicines for Children Research Network and in collaboration with Alder Hey Children's NHS Foundation Trust utilised knowledge exchange of clinic based practises such as the manipulation of dosage forms for paediatric delivery. These findings were included in the 2012 WHO Technical Report Series and form the basis of the MODRIC (Manipulation Of Drugs Required in Children) guidelines available online for other medical professionals to access (<http://www.alderhey.nhs.uk/departments/pharmacy/>).

Many relationships are forged from industrial consultancy work. We have worked with Unilever to improve the formulation of cleaning and laundry products impacting on their market share, consumer satisfaction and saving energy via lower temperature washing conditions. Our experience is that a valuable way of interacting with industry is by Knowledge Transfer funded activities, for example; with Boots (TSB funding of £250K) we are developing a health supplement rich in lycopene. With Mast Diagnostics, University of Liverpool and Public Health England (TSB funded collaborative grant - Fighting Infection Through Detection), we have been developing a rapid point of care diagnostic assay for STIs that will benefit NHS patients by providing a rapid diagnosis allowing antibiotics to be prescribed immediately. In 2009, Salt Union identified a development need with their road salt and via a Knowledge Transfer programme (KTP) we used our expertise of pharmaceutical crystallisation to improve their industrial additives creating a premium, less corrosive product with a reduction in overhead costs. This also influenced national practice as more local authorities changed over to the premium, higher performing product and Compass Minerals also applied this approach in Canada and the US.

Approach 2: Active membership and support of influential non-academic networks and working groups. We provide targeted information for policy makers, service providers and the public as well as engaging third parties and advocacy groups. Our findings have influenced policy on behaviour change; informed legislative development; contributed to improved public services; and informed public debate increasing awareness and understanding. Within the REF period, this has taken place locally (Liverpool Mayor's Task Group [2013], NHS Trusts, Clinical Commissioning Groups); nationally (Alcohol Responsibility Deal, National Needle Exchange Forum [2009-2012], Advisory Council of the Misuse of Drugs [from 2011]); and internationally (International Club Health Conferences [founder and organiser since 1999] and European Centre for the Validation of Alternative Methods Advisory Group). For example, at the request of Food Active (a healthy weight campaign established by the North West Directors of Public Health), we have completed an evidence review exploring the impact and effectiveness of food taxes on sugar sweetened drinks and obtained insight data on economic drivers of behaviour change that will be used by Food Active to develop national and local food policy.

Approach 3: Infrastructural support for translational and impact focussed research. Research and Innovation Services (RIS) help maximise the impact of our research by supporting the protection of intellectual property, attracting start-up and research funding, locating joint development partners, negotiating licence deals and establishing spin out companies. For example, a spin out company, Pharmalucia (established April 2008), published three PCT patent applications (WO2009/047534, WO2011/114137, and WO2010/097626). Another company, Pulmorphix was supported by the RIS via a £64K grant (2008) then incorporated in July 2013. They have just been awarded a TSB SMART grant of almost £90k and filed a UK priority patent application (application no: 1310502.8 filed 13/6/13). Funding from RIS (£115K) supported the development of MicroRNA-based dermaceuticals for psoriasis and a UK priority patent application was filed (application no: GB1306008.2 filed 3/4/13) and we are now looking to exploit this via research collaborations and licensing opportunities. Financial support from RIS in the form of ECR travel and research bursaries and conference attendance awards has enabled the development of key national and international collaborations to further the link between research and impact.

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Approach 4: External engagement and open access data. The University has signed-up to the Manifesto for Public Engagement (National Coordinating Centre for Public Engagement) as part of its strategic intent to share knowledge, resources and skills, and to listen to and learn from the audiences with which we engage. We successfully use technologies such as multimedia, websites (e.g. www.cph.org.uk), social media and electronic communications and other opportunities to engage directly with the general public and those specifically engaged in health related delivery. Members of some of the more vulnerable sections of society (e.g. asylum seekers, victims of violence) are represented at research seminars facilitating the secondary dissemination of key findings. A number of outputs have received significant attention via social media channels from a broad audience (researchers, practitioners and public) placing them in the top 5% of articles ranked by attention and in the 99 percentile for similar articles. For example Hughes et al., (Dying to be famous, BMJ Open, 2012) has an Altmetrics score of 163, Sumnall et al., (Multiple behavioural impulsivity tasks predict prospective alcohol involvement in adolescents. Addiction, 2013) has a score of 66 (Altmetrics) and Hughes et al. published two papers in the Lancet in 2012 (Altmetrics scores of 131 and 87 respectively) which were also given UN News coverage. A report containing our research on the 2011 EU school survey project on alcohol and other drugs (ESPAD) was translated into 22 languages (<http://www.emcdda.europa.eu/news/2012/3>) and quoted in Parliament (June 2012). The recent DH national advertising campaign is based on our research on the proportion of invisible tobacco smoke <https://www.gov.uk/government/news/campaign-warns-of-dangers-of-secondhand-smoke> Many of our research findings, datasets and tools that our knowledge has contributed to, are freely available and accessible for interrogation and use by a range of professionals and other academics (e.g. Local Alcohol Profiles for England [LAPE] and QSAR tools [VEGA, OECD QSAR Toolbox, Toxtree and the COSMOS database]).

c. Strategy and plans

This UoA has a cross-Faculty strategy guided by the LJMU strategic plan and the individual School and Faculty Management Teams. A key element is to maximise the impact of research findings and new data by working with our external partners and users to prioritise our applied research and fully capitalise upon commercial opportunities and/or the dissemination of information to appropriate audiences such as industry, policy makers, service providers and the public. From 2013 onwards our overriding aim is to create more mature pathways to impact with the recognition that non-academic impact can manifest itself in different ways, and that different strategies are required to recognise and capitalise upon potential impact. In recognition of the growing importance of impact activities on research, funding and staff development we have set the following three strategic goals to:

1. Embed impact at the core of our research activity from conception to translation of impact by identifying, developing and extending close working relationships with local, national and international external partners in industry, health trusts and public sector organisations.
2. Provide infrastructural support for staff and PGRs engaged in impact focused research and use impact activities to inform the annual personal development and performance review process, the workload allocation model and part of the criteria for career progression.
3. Place public engagement and the recording of research impact at the core of our scholarly activities and establish a public Engagement and Impact Group to link with external agencies to collate and develop a robust framework to capture and monitor the on-going and accumulative impact of our research.

d. Relationship to case studies

The four case studies presented in REF3b used the following approaches to impact: In the New Computational Tools for the Improved Hazard Assessment of Chemicals study collaborations with the OECD (Approach 2) were essential to securing impact and this knowledge fed into the development of a publically available database (Approach 4). The Developing New Approaches for the Safety Assessment of Cosmetics to Replace the Use of Animal Testing study collaborated with European regulatory authorities and industry (Unilever, Proctor & Gamble, Shell, Marks and Spencer) using approaches 1 and 2; and fed knowledge into publically available databases (Approach 4). The consumption of alcohol in children and young people case study collaborated with Trading Standards North West and influenced policy and local area alcohol strategies across England (Approach 1). The new psychoactive drugs case study collaborates with partners including PHE, the DH, HO and ACMD (Approach 2).