Institution: Teesside University
Unit of Assessment: 3; Allied Health Professions, Dentistry, Nursing and Pharmacy

a. Overview

Our submission comprises a single research group whose work is organised across two interrelated strands – **rehabilitation sciences** and **public health**. Our research is structured through the University's research institutes, with the majority of submitted staff from the Health and Social Care Institute (Director: **Shucksmith**). The launch of the University's research institute structure after RAE 2008 enabled the concentration of research resources and the ability to formally performance manage research output. In rehabilitation sciences, our work addresses disabling and painful conditions, and exercise and physical activity interventions and measurement. Our public health strand focuses on the generation, translation, and application of research evidence in policy and practice. Areas of interest include children and young people's health, oral public health, shift work and health, public health aspects of end of life care, measurement of physical activity, and biostatistics. We are an integral part of **Fuse, the Centre for Translational Research in Public Health**, which is a UK Clinical Research Collaboration (CRC) funded Public Health Centre of Excellence. We are also, through Fuse, members of the **National Institute for Health Research (NIHR**) **School for Public Health Research**, which aims to produce research evidence to support public health in England. Our two research strands are **synergistic**; many of our researchers work across both strands in common themes.

b. Research Strategy

Our main strategic aim in this period was to focus our research sharply on our twin strengths in rehabilitation sciences and public health. Specifically, after critical reflection on the sub-panel feedback from RAE 2008 we aimed to improve the quality, quantity, and spread of external income; PhD completions; research career development; the synergy across and within research strands; and the quality of our outputs. Following RAE 2008, the University conducted a critical evaluation of its research activity resulting in the formation of five research institutes as a formal organisational structure. This structure has eliminated artificial boundaries between Schools, bringing together researchers with cognate interests and facilitating interdisciplinary collaborations. An example is **Azevedo and Batterham's** (School of Health and Social Care) work with **Spears** (School of Social Sciences and Law), and Dr Wen Tang (School of Computing) on 'The development and evaluation of an 'exergaming' intervention to target cardiovascular and mental health outcomes' (Engineering and Physical Sciences Research Council [EPSRC], Digital Economy 'Research in the Wild' grant). This project is typical of the **inherently interdisciplinary focus of our work**, based on a 'team science' philosophy (http://teamscience.nih.gov), and involved experts in exercise physiology, biomechanics, computer gaming, complex interventions, medical sociology, and trial design and biostatistics (http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/I001891/1).

The sub-panel feedback in RAE 2008 stated that "external research income and PhD completions per research-active staff FTE were markedly below the unit median." **We have addressed these weaknesses in the intervening period**. In the Table below we illustrate the marked improvements in this cycle.

Metric	RAE 2008	REF 2014	Improvement*
Number of PhD completions per FTE[#]	0.77	1.51	↑ 2.6 ×
Research Income per FTE[#] (£)	63,904	205,434	↑ 4.2 ×

Adjusted for the different length of census period in REF 2014 (1 August 2008 to 31 July 2013) vs. RAE 2008 (1 January 2001 to 31 July 2007). # Per Category A FTE

In addition, we have increased the depth and breadth of our funding and research studentships, across a larger number of researchers and with funding drawn from higher-quality sources. Improvements in number of PhD studentships and completions have resulted from the University's continuing investment in a programme of internally funded doctoral scholarships, established after RAE 2008, together with externally funded studentships (including by Research Councils UK).

A major enhancement of our research environment resulted from our successful bid in 2008 (in collaboration with the four other North East universities) to become one of five UK CRC Public

Health Centres of Excellence: *Fuse*, the Centre for Translational Research in Public Health (www.fuse.ac.uk). **Batterham, Rushmer,** and **Shucksmith** are Fuse senior investigators, with **Shucksmith** also an Associate Director. The Fuse grant provided substantial funding for capacity building in the form of research staff (**Azevedo, Rushmer**) and two Economic and Social Research Council (ESRC) PhD studentships. In 2013, the funding for Fuse was renewed for a further 5 years (> £4 million) following rigorous external review (including international expert peer review).

Sub-panel feedback in RAE 2008 indicated that "Evidence of synergy across, and to some extent within, the research groupings was judged to be limited." ***Our revised structure and approach has addressed this perceived weakness.*** We operate as a single group to concentrate resources and achieve an effective critical mass, with a substantial proportion of our researchers working across both public health and rehabilitation strands. Common themes include measurement issues, systematic reviewing and meta-analyses, physical activity and exercise interventions, and a focus on knowledge translation. Our research strategy has led to a **marked improvement in both the quantity and quality of our research outputs from January 2008**. In this census period, across the 17 researchers submitted to REF 2014 we have published **in excess of 300 journal articles that have been cited over 3000 times** (Scopus database).

Over the next 5 years we aim to continue securing high-quality funding and producing world-leading and internationally excellent research in public health and rehabilitation; to build capacity by recruiting, training, and developing young researchers; and to target PhD studentships via internal and external funding routes. In public health, our work will be centred within Fuse and the NIHR School for Public Health Research. The award of five further years of funding for Fuse in 2013 is to support research in six programmes, with Teesside researchers integral to four of these, as detailed in the Table below:

Programme	Researcher	Role
Early Life and Adolescence	**Shucksmith**	Deputy Programme Leader
	Azevedo	Principal Investigator (PI)
	Batterham	PI
	Ells	PI
Healthy Ageing	**Batterham**	PI
Behaviour Change	**Azevedo**	PI
	Batterham	PI
Translational Research	**Rushmer**	Programme Leader
	Ells	PI
	Shucksmith	PI

We are able to **respond to national and international research priorities and initiatives** through our contribution to Fuse, the NIHR School for Public Health Research, and the Public Health England Obesity Knowledge and Intelligence team (**Ells**). In addition, we are involved in the Chartered Society of Physiotherapy's Research and Development sub-committee *and* Research Priorities project (**Dixon**), and the Allied Health Professions Research Network (**Dixon**, **Ryan**). Internationally, through Fuse, we have recently established a **formal link with the Bronfenbrenner Center for Translational Research** at Cornell University (http://www.bctr.cornell.edu). Our recently funded projects include ***Evaluation of babyClear****,* a smoking cessation intervention with pregnant women (**Hamilton** and **Shucksmith**, with Newcastle University as a Fuse project) - NIHR School for Public Health Research funding**; *Risky sexual behaviour and alcohol misuse in young people: developing a multi-component universal education intervention*** (**Shucksmith**, with Universities of Bristol, Liverpool and Lancaster (LiLac), Sheffield, Peninsula Medical School, and University College London) - NIHR School for Public Health Research funding; and **a feasibility study of high-intensity interval exercise training before abdominal aortic aneurysm repair** - NIHR Research for Patient Benefit programme (**Danjoux**, **Batterham,** and **Martin**: http://www.controlled-trials.com/ISRCTN09433624). In rehabilitation sciences we plan to build on the successful research track on chronic pain, prehabilitation, rehabilitation, and perioperative care in a variety of patient groups, led by **Batterham** and **Martin** in collaboration with NHS clinicians. (For example, our successful trial of an exercise intervention in intensive care unit survivors funded by the NIHR Research for Patient Benefit programme, and our work funded by the Medical Research Council Lifelong Health and

Wellbeing programme - Engaging with Older People and their carers to Develop and Deliver Interventions for the Self-management of Chronic Pain (EOPIC).)

In this cycle we have established world-leading/ internationally excellent research programmes in the following areas, and we plan to build on this success in the next 5 years*: fluoride and dental health*, led by **Zohoori**; *textured insoles to improve balance and walking ability* (**Dixon**, **Martin**); *and clinical shoulder conditions* (led by **Hanchard** and **Handoll**). With respect to the latter, **Handoll**, **Hamilton**, and Mr Amar Rangan (NHS consultant and Visiting Professor at Teesside) are co-investigators in the *ProFHER* (PROximal fracture of the humerus: Evaluation by randomisation) trial. This study is an ongoing pragmatic multi-centre randomised controlled trial of surgical versus non-surgical treatment, led by Teesside and funded by the NIHR Health Technology Assessment (HTA) programme (*BMC Musculoskeletal Disorders*, 10 (1), art. no. 140, 2009).

c. People, including:

I. Staffing strategy and staff development

Sub-panel feedback in RAE 2008 stated that "evidence of robust staffing policies reflecting support, growth or sustainability was limited." **We have now addressed this weakness**. First, in REF 2014 our submission clearly demonstrates continuity and sustainability, **with 11 of our 16 submitted Category A staff also returned in RAE 2008**. The additional five staff members reflect substantial, high-quality capacity building in this cycle. **Atkinson** was recruited in 2012 under the University's Research Enhancement Strategy to support the upcoming REF exercise. (We also re-recruited **Ells** through this programme; post-RAE 2008 Ells took up a post at the North East Public Health Observatory.) **Azevedo** and **Rushmer** were secured using Fuse capacity-building funding. **Bettany-Saltikov** and **Ryan** were enabled to produce high-quality research to permit inclusion in REF 2014 by internally funded research sabbaticals. We also developed and implemented a 'Building Careers' strategy to create post-doctoral opportunities for people whose training we have invested in heavily, resulting in the retention of four of our PhD students to date.

We aim to recruit and retain staff whose expertise aligns with either or both of our twin research strands. We also recognise the need to recruit staff whose work may be facilitated within existing physical infrastructure. Where we do not have specialist facilities for a researcher we wish to recruit, we negotiate new space and equipment, and collaborate with regional partners (e.g. **Zohoori's** laboratory-based fluoride assay work).

The University adopted the Concordat Principles at their launch in 2008, and in 2013 received the European Commission's *HR Excellence in Research* award. The University has cross-institution *Investors in People* Gold accreditation. All researchers are recruited using a standard, transparent recruitment process. All new staff members undertake an Initial Development Plan, reviewed at least annually to identify and monitor development needs and longer-term career priorities. The Department for Learning Development offers an Initial and Continuing Professional Development Programme (a wide range of workshops including project management, effective communication and managing / leading change), and the Graduate Research School provides a programme of training for researchers. Researchers are encouraged to use Vitae's Researcher Development Framework to reflect on their skills and training needs, and to discuss this with their manager during development reviews. The University monitors the cessation of fixed-term contracts, and support is offered to researchers approaching the end of a fixed-term project contract which will not be renewed through the operation of a Redeployment and Pay Protection Policy; those who are "at risk" are given priority consideration for new vacant posts for a period of up to six months prior to the end of their contract. We are committed to encouraging and embracing diversity, equality of access, esteem and opportunity and actively opposing and eradicating prejudice, and all of our researchers involved in recruiting research students or staff members have received appropriate Equality and Diversity training. The University Staff Development and Mentoring programmes, together with events available through Fuse, provide training and support for all phases of the research process, including proposal development, ethics and research integrity, scientific writing and presentation, and dissemination and knowledge translation. Our staff workload model concentrates on research-focused teaching; this symbiosis represents an efficient use of resources and enables high-quality research.

The integration of clinical academics and NHS-employed researchers is a central part of our research strategy. In 2010, a former Teesside PhD student (Harland) was awarded a NIHR Clinical Academic Training Clinical Lectureship in Physiotherapy (mentored by **Martin**), funding 50% of his time until 2013. The work of Professor Gerard Danjoux, Mr Amar Rangan (both Visiting Professors), and Dr Sam Eldabe (Visiting Fellow) – all consultants and researchers in South Tees Hospitals NHS Foundation Trust – is embedded in our unit, collaborating with **Batterham**, **Martin**, **Handoll**, **Hamilton**, **Hanchard**, and recently **Atkinson** (a new programme of work with **Danjoux** in obstructive sleep apnoea). The research is focused on the co-production of knowledge, with an emphasis on *practice-based evidence* (of real-world problems faced by clinicians and consumers of healthcare) to *evidence-based practice* (knowledge translation leading to rapid changes to policy and practice in healthcare based on research findings).

We are effectively developing and nurturing the next generation of researchers in our unit by aligning our research assistants and post-doctoral researchers with senior investigators and teams. Evidence of the success of this strategy includes lead-author outputs produced by research assistants; for example, **Jones** (A qualitative study of patients' perceptions and priorities when living with primary frozen shoulder*. BMJ Open 2013;3:e003452;* Introducing a new stop smoking service in an acute UK hospital: A qualitative study to evaluate service user experience. *European Journal of Oncology Nursing*, 2013, 17 (5): 563-569); **Carlebach** (A review of an out-of-hours telephone support service for palliative care patients and their families. *International Journal of Palliative Nursing*, 2010, 16 (9): 445-450); **McNaughton** (Making a success of providing NHS Health Checks in community pharmacies across the Tees Valley: A qualitative study. *BMC Health Services Research*, 2011, 11, art. no. 222).

Consistent with the principles of the Concordat, the development of our researchers is supported by a University commitment to developing and sustaining internationally excellent and world-leading research as part of its mission and values. Five of our submitted researchers have been promoted during the census period in recognition of their outstanding research achievements. These are **Batterham** (promoted to Professor, 2009), **Dixon** (to Reader, 2009), **Martin** (to Professor, 2009), **Spears** (to Professor, 2011), and **Zohoori** (to Reader, 2012). In addition, **Ells** was re-recruited at Reader level. More junior researchers are mentored within our 'team science' approach, alongside the University's Personal Development Review programme.

c. II. Research students

Our doctoral research training draws on our research strengths in advanced qualitative and quantitative methods, specifically in health research methodology, measurement, biostatistics, participatory research, and systematic reviewing. Doctoral students are provided with a training package tailored to their programme of work and research questions.

Training in qualitative methods (led by **Shucksmith**, **Hamilton**, **Martin**, and **Rushmer**) includes participatory research, grounded theory, realist syntheses, sampling methods, and generalisability. Doctoral students using qualitative methods are also supported through peer learning within the Fuse *Qualitative Studies Group*, which meets monthly to debate methodological issues through guided reading and seminars, and our unit's *Qualitative Research Forum*. All doctoral students are exposed to advanced systematic review methodologies, developed in our work for the National Institute for Health and Care Excellence (NICE) and the Cochrane Collaboration (e.g. **Ells**, **Bettany-Saltikov**, **Handoll**, **Hanchard**). Training in quantitative methods is rigorous and comprehensive, co-ordinated by **Batterham** and **Atkinson**, both Fellows of the Royal Statistical Society and producers of a substantial body of work in research methods, measurement, and biostatistics. Our doctoral training is research-led, using our key research outputs as learning materials. Examples include **Batterham's** work on statistical reporting guidelines (Progressive statistics for studies in sports medicine and exercise science. *Medicine and Science in Sports and Exercise*, 41 (1): 3–12, 2009; cited 323 times on Scopus database), and **Atkinson's** paper on 'Statistical methods for assessing measurement error (reliability) in variables relevant to sports medicine' (*Sports Medicine*, 26 (4): 217-238, 1998; cited 845 times on Scopus).

We also provide bespoke discipline-specific training in the quantitative measurement of health outcomes, including a critical focus on the importance of measurement error. This training

represents an interdisciplinary symbiosis of measurement and biostatistics, exercise physiology, biomechanics, behavioural medicine, and rehabilitation research using state-of-the art equipment and technology in both laboratory and field settings. In addition, all doctoral students must take part in generic and subject-specific research ethics and governance training.

Our research students are co-located with researchers at all levels, enabling frequent formal and informal exchanges within a peer-support model. This co-location strategy promotes interdisciplinary work, and provides effective mentoring of earlier career researchers. There is a monthly in-house programme of interactive support sessions, with **Hanchard** as a named mentor and point of contact (beyond the postgraduate tutor and supervisory team), for student welfare issues. We have established a research institute seminar series, research brainstorming sessions to fuel new projects and grant applications, a journal club, and a qualitative research forum. Through Fuse, we link to broader postgraduate research forums, quarterly research meetings, and training initiatives to make best use of the critical research mass in the region to broaden experience and training for earlier career researchers. An example is the establishment in 2011 of the **North East Medical Sociology Study Group** (http://www.britsoc.co.uk/study-groups/north-east.aspx), co-convened by **Shucksmith** (with Dr Sally Brown, Durham University). In addition, via Fuse, we obtained two ESRC funded studentships in the census period. We also host the North East England Hub of the Allied Health Professions Research Network and hold meetings regularly.

d. Income, infrastructure and facilities

Our research income spend in this census period **exceeds £3.2 million - an increase per FTE of over 4-fold versus RAE 2008**. Moreover, this income is now distributed across a much wider range of researchers and funding sources. A substantial proportion (> 40%) of our income was from UK Research Councils (ESRC, EPSRC, MRC) and NIHR funding programmes (e.g. Research for Patient Benefit, HTA, Health Services and Delivery Research). This funding profile is markedly different to that in RAE 2008 – at that time no income from UK Research Councils and very limited funding from NIHR streams – and is a clear marker of the success of our strategy. All of our 17 submitted researchers were chief, principal, or co-applicants (within our team-science philosophy) on our funded projects in this cycle. We have use of laboratory space and facilities for staff researchers and PhD students both cross-campus (Schools of Health and Social Care, Social Sciences and Law, and Science and Engineering) and beyond (hospital-based). Our facilities (including specialist technician support) and significant equipment, outlined in the Table below, facilitate the accurate and precise measurement of a wide range of health outcomes.

Facility	Significant Equipment
Teesside Centre for Rehabilitation Sciences (James Cook University Hospital)	GAITRite instrumented walkway; Kistler force platforms; Electromyography (EMG) systems (Delsys, Biopac, Mega)
Constantine Building Laboratories	As above (essentially parallel facility)
Biomechanics laboratory	Kistler force plates; 6-camera Vicon motion capture system; Privo and SportsCam high-speed cameras; EMG systems (Aurion, Biopac); XSens motion tracker system
Sports Therapy and Healthcare laboratories	Woodway non-motorised treadmill; Biodex isokinetic dynamometer; Biodex balance platform; AMTI force plates; underwater treadmills; swimming flume; underwater cameras
Exercise Physiology laboratory	Woodway, H/P/Cosmos, and Technogym treadmills; upper body (Lode), cycle (Lode, Monark), and rowing (Concept 2) ergometers; metabolic systems for measurement of energy expenditure; Portable blood analysis equipment; 8-electrode bioimpedance spectroscopy analyser for body composition testing; multiple Actiheart single-piece heart rate and accelerometer devices for measuring free-living energy expenditure; Reltech environmental chamber
Materials laboratory	Fluoride electrodes, fluoride meters, centrifuges, ashing furnace, muffle furnace

Our research Institute operates within the existing mature Teesside University Research Governance Policy (http://www.tees.ac.uk/sections/research/governance.cfm). This Policy involves Research Ethics Committees operating at School level. In response to the specific complexities of governance and ethics in the allied health field our School of Health and Social Care committee operates as a Research Governance and Ethics Committee. Due to the nature of the majority of research undertaken within our research Institute the key external reference for research governance is the Department of Health (DoH) Research Governance Framework for Health and Social Care 2nd Ed (DoH, 2005). The School acts as Sponsor (on behalf of Teesside University, which is a registered DoH Sponsor) for all Institute research. The University holds not only Public and Products Liability (including Medical Malpractice cover) and Employers Liability but also separate Clinical Trials insurance cover.

Our Research Governance Policy is in place to encourage and support research and protect all of those involved - sponsors, staff and student researchers, academic supervisors, participants, and collaborators - and to assure the highest standards of quality. To facilitate these principles, the School maintains a full-time Principal Lecturer post in Research Governance with the remit to:

- Lead and enhance Research Governance within the Institute
- Oversee day-to-day application and enactment of the Policy and related procedures
- Ensure the Policy remains current
- Facilitate Research Governance and Ethics Committee and Research and Development Committee annual reviews of the Policy and make any amendments or revisions prior to submitting to School Policy committee for ratification
- Chair the Research Governance and Ethics committee and serve as a member of the School Policy and Research and Development committees, and the University Research Ethics Committee
- Provide training and support for School staff and enrolled students in all aspects of Research Governance and Ethics

The Institute also delivers regular programmes of research governance training for staff and students at all levels. This training covers the requirements and expectations of the Research Governance Framework, Health Research Authority, National Research Ethics Service, NIHR and NHS Research and Development, and related Research Council, Good Clinical/ Research Practice Policies and Guidance Documents, and for Clinical Trials: EU Directive 2001/20/EC, Medicines for Human Use (Clinical Trials) Regulations 2004 SI 2004/1031, and the Medicines and Healthcare products Regulatory Agency. In addition regular sessions are offered on negotiating the Integrated Research Application System, which cover the scope and remit of the system and practical guidance on making an application. Additional ad hoc sessions and one-to-one project-specific guidance are available to all staff and supervisors on request with the Principal Lecturer in Research Governance.

All Chief Investigators are required to 'sign-off' their Ethics Clearance Applications and to complete the School's required supervisor's training on Research Governance and Ethics. This training is mandatory for all staff as part of induction and staff members are also required to attend an Annual Update session to ensure currency. Parallel training is also offered to all students. The University Research Ethics Committee audits all School Research Ethics Committees on an annual basis. All of our work crossing institutional, national, disciplinary, and sector boundaries is conducted in accordance with the principles laid down in the *Montreal Statement on Research Integrity in Cross-Boundary Research Collaborations* (www.cehd.umn.edu/olpd/MontrealStatement.pdf; *Lancet*, 382, 1310, 2013).

e. Collaboration and contribution to the discipline or research base

Sub-panel feedback following RAE 2008 stated that "The evidence of esteem was judged to be below that of other evidence in the submission, such as the research outputs profile." We have addressed this perceived limitation in the intervening period. Evidence of our **high-level participation in the peer review process, journal editorships, Fellowships or other relevant awards, and wider contributions to the discipline** is provided in the Table, below.

Name	Evidence	Dates
Atkinson	Fellow of the Royal Statistical Society	Current
Atkinson	Member of the Editorial Advisory Board for *BMJ Open*	Current
Atkinson	Editor for the *International Journal of Sports Medicine*	Current
Atkinson	Co-recipient of The President's Medal (Institute of Ergonomics and Human Factors) for world-leading research in Chronobiology	2008
Atkinson	BUPA Health at Work award for excellence in occupational medicine (for his MRC NPRI project on shiftwork and health)	2010
Batterham	Associate Editor for *Medicine and Science in Sports and Exercise*	Current
Batterham	Member of the Statistical Advisory Board for *BMJ Open*	Current
Batterham	Fellow of the Royal Statistical Society	Current
Batterham	Fellow of the American College of Sports Medicine	Current
Batterham	Member of the External Advisory Board for the International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE)	Current
Batterham	Member of the North East Regional Funding Committee for the NIHR Research for Patient Benefit Programme	2008-2013
Dixon	Associate Editor for *BMC Sports Science, Medicine & Rehabilitation*	Current
Dixon	Member of the Editorial Board for the *Journal of Pain Management*	Current
Ells	Member of the NICE Weight management before, during and after pregnancy (PH27) Expert Review Group	Current
Hanchard	Methodological Editor of the Cochrane Bone, Joint and Muscle Trauma Group	Current
Handoll	Coordinating Editor of the Cochrane Bone, Joint and Muscle Trauma Group	Current
Martin	Member of the Editorial Board for the *Journal of Pain Management* and *Physiotherapy Practice and Research*	Current
Martin	Member of the North East Regional Funding Committee for the NIHR Research for Patient Benefit Programme	Current
Martin	Mentor for the NIHR Health Research Training Fellowship scheme	Current
Rushmer	Member of the Research Funding Board for the NIHR Public Health Research Programme	Current
Ryan	Editor-in-Chief of *Pain and Rehabilitation* - the Journal of the Physiotherapy Pain Association	Current
Shucksmith	Member of the North East Regional Funding Committee for the NIHR Research for Patient Benefit Programme	2006-2011
Shucksmith	Member of Health Research Board Interdisciplinary Capacity Enhancement Awards Panel, Republic of Ireland	Current
Shucksmith	Associate Editor for *BMC Public Health*	Current
Van Wersch	Fellow of The British Psychological Society	Current
Zohoori	Member of the WHO expert panel on Global Oral Health Programme technical working group to revise the WHO guidance document "Monitoring of Renal Fluoride Excretion in Community Preventive Programmes on Oral Health"	2011

There is clear evidence of the scientific impact of our research outputs on the wider discipline, shaping health research methodology and improving data analysis and research reporting. **Atkinson's** 2011 paper on 'Assessment of flow-mediated dilation in humans: a methodological and physiological guideline' (*American Journal of Physiology Heart and Circulatory Physiology*, *300* (1): H2-12) has been **cited 144 times** (Scopus) and ranks **378th (from c. 700,000 published outputs)** for most cited outputs from 2011 in the 'Medicine' subject category. **Batterham's** work on

'Progressive statistics for studies in sports medicine and exercise science (*Medicine and Science in Sports and Exercise*, 41 (1): 3-12, 2009) has been **cited 323 times** (Scopus) and is the **6th most cited output from that year in the 'Health Professions' subject category** (from > 25,000 outputs published in the same year). This paper is also **ranked in the top 1000 for citations for all outputs published worldwide in all fields in 2009** (968th from > 2 million outputs; Scopus).

Beyond our collaborations with world-class groups through Fuse and the NIHR School for Public Health Research, we have established research links with NHS Choices, Public Health England, Clinical Commissioning groups, and Local Authorities. An excellent example of our effective academic-NHS collaboration is the NIHR HTA-funded *ProFHER* trial described in Section b. (http://www.nets.nihr.ac.uk/projects/hta/0640453), led by Teesside with co-investigators drawn from the Universities of Leeds, Queen Mary of London (QMUL), York, and Nottingham, the Freeman Hospital Newcastle, University Hospitals of Leicester, and NHS Manchester.

We have also forged strong links with industry partners. **Zohoori** led a project funded by the healthcare company **Johnson & Johnson** testing the benefit of the combined use of fluoridated toothpaste and a fluoridated mouthwash (*Caries Research*; 43: 391-396). The findings formed part of a position paper in the *British Dental Journal* (212*: 315-320, 2012*). **Batterham's** clinical trials in chronic pain management with Dr Sam Eldabe (Teesside University Visiting Fellow) were funded by the neuromodulation division of **Medtronic** – a multinational medical device technology company. This work - involving industry, the NHS, and EHC-Hôpital de Morges, Switzerland - includes the first double-blind randomised trial of spinal cord stimulation (*Neuromodulation* 16: 363–369. 2013) and two other published trials (*Pain Medicine*, 12 (4): 571-576, 2011; *Neuromodulation 2012; e-pub ahead of print. DOI: 10.1111/ner.12003*).

Our research strategy actively fosters collaborations at national and international level, with many materialising through the visible strength of our reputation in public health and rehabilitation sciences. For example, **Zohoori** is now a recognised world authority on fluoride research in public health, resulting in several collaborations including: the Tanzania Food and Nutrition Centre (funded by the Royal Society); the College of Medicine, University of Nigeria (funded by the Borrow Foundation); the Division of Preventive Dentistry, Niigata University, Japan; and the Institute of Nutrition and Food Technology, University of Chile. International collaboration has been labelled as the 'fourth age' of research (following individual, institutional, and national) and analyses of citation impact show unequivocally the benefit of international co-authorship (*Nature*, 497: 557-560, 2013). **One-third of our outputs submitted in REF 2 have at least one international co-author**. We also develop and nurture such partnerships through our University's *International Visiting Academic* scheme. Examples of recent visits and associated outputs are given in the Table below.

Name	Visiting Academic	Output
Azevedo	Dr Carla Vidoni (University of Louisville, Kentucky) 2011	Co-authored paper in *European Physical Education Review*, 18 (1): 78-96, 2012
Batterham	Prof Will Hopkins (AUT, Auckland) 2011	Co-authored paper in *British Journal of Pharmacology*, 165 (4): 782-784, 2012
Dixon	Dr Pat McKeon (University of Kentucky) 2010	Co-authored paper in *Journal of the American Podiatric Medical Association* (In Press); co-investigators on a PhD studentship grant awarded by the Multiple Sclerosis Society
Hamilton	Prof Lin Perry (University of Technology Sydney) 2010	Co-authored paper in *Worldviews on Evidence-Based Nursing*, 10 (1): 17-40, 2013
Hanchard	Dr Mario Lenza (University of Sao Paulo) 2010	Co-authored editorial in *Cochrane Database of Systematic Reviews* 2013;10:ED000068. dx.doi.org/10.1002/14651858.ED000068
Zohoori	Prof Marília Buzalaf (Bauru Dental School, University of São Paulo) 2012	Co-authored paper in *European Journal of Oral Sciences*, 121 (5): 457-464, 2013