**Institution: The University of Manchester**

**Unit of Assessment:4**

**a. Overview**

Research in psychology, psychiatry and clinical neuroscience at the University of Manchester (UoM) focuses on basic research and translational-innovation pipelines, leading from discovery in biological, cognitive and developmental sciences, through models of normal and abnormal function and behaviour, to developing theory-driven interventions, delivery methods and evaluation. The research is coordinated and facilitated principally in the **Institute of Brain, Behaviour and Mental Health (IBBMH),** one of 6 research priority areas of the Faculty of Medical and Human Sciences (FMHS). IBBMH is an interdisciplinary, integrative and facilitatory structure with world-leading centres in developmental, cognitive and experimental psychology, mental health sciences, neurology and clinical neuroscience. IBBMH comprises 4 thematic and 2 cross-cutting centres (*section b*), with which the 77 staff (67.7 FTEs) in UoA4 are affiliated. Manchester Academic Health Sciences Centre (MAHSC) provides a clinical test-bed and accelerates the implementation of innovations from our research. Mental health is a priority area in MAHSC. The significant planned re-structuring of our research environment since RAE2008 has been designed to: i) align to national and global priority areas, focusing on impact-orientated research, and ii) capitalise on the uniqueness of UoM research in spanning the innovation pipeline from basic discoveries to the delivery of healthcare services. We undertake research programmes to:

- ***Discover*** neurobiological and cognitive mechanisms of behaviour in health and disease.
- ***Develop*** improved diagnostics and prognostics, and effective pharmacological and psychological interventions based on neurobiological and cognitive mechanisms.
- ***Deliver*** properly evaluated interventions with our NHS partners to promote improved physical and mental health and wellbeing.

UoM commitment to mental health and neurodegeneration as a major strategic theme is reflected in investment in people (e.g. 8 new chairs since 2011, plus 6 professorial promotions; *section c*) and facilities (e.g. new and upgraded imaging facilities; *section d*). Since 2008, the UoA has:

- Secured new awards of £68m (24 awards >£500k) across the translational pipeline.
- Published 2557 journal papers, an average of 33 unique papers per returned staff.
- Awarded 144 PhDs, with 102 students currently enrolled.
- Impacted mental health policy and practice nationally and internationally (*section e*).
- Made 94 inventive disclosures, 7 patent applications and 1 licensing agreement.
- Sustained and further developed national and international collaborations (*section e*).

Highlights of achievements during the assessment period

***Discovered***

- Genetic causes of fronto-temporal dementia (FTD) (**Pickering-Brown** *Neuron* (2011) 72:257-68; *Nature Genet* (2010) 42:234-9).
- Association between low birth weight in babies and risk of adult mental health problems (**Abel** *Arch Gen Psych* (2008) 65:146-152).
- Neurochemical mechanisms of psychosis (**Deakin** *Arch Gen Psych* (2008) 65:154-164).

***Developed***

- New PET methods for early detection and characterisation of dementia (**Herholz** *J Nucl Med* (2011) 52:1218-1226).
- Mobile health approaches for tracking symptoms (**Lewis** *BMC Psychiatry* (2013) 13:34).
- Suicide reduction strategies in clinical populations **(Shaw** *Lancet* (2012) 379:1005-1012).

***Delivered***

- Surgical interventions for prevention of cardiac emboli as a risk factor for Alzheimer's disease (**Burns** *J Neurol Sciences* (2009) 283:17-20).
- Novel treatment for preschool children with autism (**Green** *Lancet* (2010) 375:2152-2160).
- Evaluations of new psychological interventions in psychosis in the largest clinical trials to date of people at risk of psychosis (**Morrison** *BMJ* (2012) 344:e2233*),* and with psychosis plus substance use (**Barrowclough** *BMJ* (2010) 341:c6325).

**b. Research strategy**

Since RAE 2008, the core research strategy within psychology, psychiatry and neurosciences has been to expand world-leading research capability, while bringing together new research teams to enhance multi-disciplinary capacity. These teams have the breadth of expertise needed to tackle national (NHS/NIHR; MRC) and global (WHO; NIH) priority challenges: delivering measurable insights and impact on ageing, dementia and neurodegeneration; development and developmental disorders; mental health and psychosis; addictions; suicide and risk behaviour; environmental and health behaviour change. Our research strategy is aligned to the overarching Manchester 2020 Strategic Vision of the University and the FMHS 5-year strategic plan to undertake research of world-leading quality in key priority areas, recognised globally as being innovative and having an impact on healthcare. Basic and translational research into mental health and neurodegeneration is one of 6 key focus areas identified in the FMHS plan. To achieve our aims of undertaking world-leading integrated research programmes, key elements of our implemented strategy were to:

1. Promote multidisciplinary research by establishing research centres in areas of existing and potential strength and strategic importance.
2. Increase high-quality external research funding, supported by improved research support structures within UoM and FMHS.
3. Increase the quality and impact of research outputs.
4. Maintain and strengthen our links with NHS partners to facilitate impactful research.
5. Extend the reach and impact of our research by a) building on existing links with healthcare and industry partners and b) continuing to prioritise patient and public involvement in research.
6. Attract established international research leaders to strengthen our research capability and reach across translational pipelines (*section c*).
7. Nurture future research leaders by supporting early career researchers and providing exemplary PhD programmes (*section c*).
8. Maintain and develop infrastructure and facilities to support innovative translational research (*section d*).
9. Increase national and international collaborations, including part-time appointments to contribute to pivotal research areas (*section e*).

***Strategic goal 1: Promoting multidisciplinary research***

Our core aim is to undertake world-leading research with a significant impact on improving health. Prior to the assessment period, research in psychiatry, psychology and neuroscience was distributed across a number of research groupings. In the current period, we successfully initiated our drive to greater coherence and multi-disciplinarity through two university-wide organisations: the Neuroscience Research Institute and the Biomedical Imaging Institute. Our goal has now been fully achieved as part of the wide-ranging Faculty restructure in 2011-12, which identified flagship research themes, containing a critical mass of basic, translational and clinical scientists around priority areas. For this UoA, the restructure allowed us to unify research activity and develop an integrated multidisciplinary organisation with the creation of IBBMH, which brings together researchers from the School of Psychological Sciences and Manchester Medical School. IBBMH is organised around 4 core centres:

***Centre for Clinical and Cognitive Neurosciences*** focuses on discovering cognitive and biological neuroscience mechanisms of memory, language and decision-making and their impairment in dementias, aphasias and stroke. Translational projects develop novel treatments and deliver these in clinical neuroscience and dementia care settings. Members of this centre also contribute to UoA1, UoA3 and UoA5.

***Centre for New Treatments and Understanding in Mental Health*** focuses on cognitive and neurobiological mechanisms of psychosis and mental health problems, using discovery of these mechanisms to develop, deliver and evaluate new pharmacological and psychological interventions to improve mental health and wellbeing.

***Centre for Mental Health and Risk*** focuses on multi-disciplinary approaches to suicide and self-harm, offender health and addictions, and developing and delivering interventions to reduce risk, with significant impacts on policy. Members of this centre also contribute to UoA1 and UoA2.

***Centre for Developmental Science and Disorders*** focuses on discovering mechanisms of language and social development and developmental psychopathology, and developing novel interventions. Members of this centre also contribute to UoA3.

IBBMH works closely with 2 further centres that also contribute to this UoA:
***Centre for Imaging Sciences*** focuses on imaging methods development and provides core methodology expertise for neuroimaging, underpinning discovery of mechanisms and development of novel diagnostic and treatment biomarkers in mental health and neurodegeneration. Members of this centre also contribute to UoA1and UoA11.
***Manchester Centre for Health Psychology*** focuses on health behaviour, development and delivery of psychological and behavioural change interventions and evaluation of quality of life. Members of this centre also contribute to UoA2 and UoA3.

Multidisciplinary research across the translational pipeline critically involves collaboration with the Faculty of Life Sciences (FLS), with its strengths in basic neurosciences. UoM recognises the importance of cross-Faculty research in biomedical science and FMHS and FLS have each contributed £250k to pump-prime novel projects, with an additional £212k from the Wellcome Trust Institutional Strategic Support Fund. Prioritisation of cross-faculty research presents numerous opportunities for this UoA; examples of successful collaboration are in pre-clinical neuro- and stem cell imaging where MRC and BBSRC have funded collaborative grants worth £1.1m and £750k imaging equipment (**Williams**, **Asselin** with *Luckman, Allan*, *Kimber* (all UoA5). UoM's involvement in the EU-funded InMIND consortium on neuroinflammation and microglia in neurodegeneration arose from collaboration between FMHS (**Herholz, Gerhard**) and FLS (Boutin).

***Strategic goals 2 and 3: Increasing funding and quality and impact of outputs***
Taking advantage of the facilitating infrastructure in FMHS (see *section d*), since 2008, we have secured research income totalling £68m (see further details in *section d*), an increase of over 50% from 2008 (£42.2m across UoAs 9 and 44). Returned staff have published 2557 research papers (an average of 33 unique outputs per person, an increase of 21% from 2008). In the UoM annual performance review (2012-13) IBBMH scored highest across the university on two key indicators, research grant income per academic and percentage of outputs in the top 10% of citations in the field (32% over 5 years). Examples of headline achievements of our multi-disciplinary approach to priority challenges are given below, showing how our strategy has attracted major funding and produced internationally important outputs across the translational spectrum. We provide an example for each of the 4 IBBMH centres, incorporating imaging methods and health psychology.

Translational research focus: Dementia and Neurodegeneration
***Discovery***:
- Found the first gene for FTD and a repeat expansion mutation that is the most common genetic cause of FTD (**Pickering-Brown** *Nature Genet* (2010) 42:234-9) and proved, on the basis of molecular mechanisms, that FTD and MND are part of a disease spectrum (**Pickering-Brown** *Neuron* (2011) 72:257-68; £1.5m MRC grant).
- Capitalised on neuroimaging developments to characterise memory and language impairments (**Parker**, **Parkes**, **Lambon Ralph**, **Montaldi,** e.g. *Nature Neurosci* (2008) 11:834-842; *Neuron* (2011) 72:385-396; £2m MRC renewed programme grant).

***Development:***
- Highlighted the potential of FDG PET as a potential diagnostic and prognostic biomarker for early Alzheimer's disease (**Herholz, Gerhard** *J Nucl Med* (2011) 52:1218-1226; EU funding total £870k).
- Developed therapies for object name relearning in stroke aphasia, semantic dementia and Alzheimer's disease. (**Lambon Ralph** *Neuropsychol Rehabil* (2012) 22:215-34**).**

***Delivery:***
- Evaluated surgical interventions to prevent cardiac emboli as a risk factor for Alzheimer's disease, an example of how previous basic science discovery in Manchester (**Burns** *BMJ* (2006) 332:1119) has led, via development of interventions, to improved healthcare.
- Novel aphasia therapy for people with acute, chronic and degenerative conditions (*Sage* (UoA3)**,** *Neuropsych Rehabil*, (2011) 21:26-41).

Translational research focus: Psychosis
***Discovery:***
- Identified novel mechanisms of antipsychotic action using preclinical psychopharmacology

with fMRI and pharmaco-MRI (**Williams**, **Deakin** *Arch Gen Psych* (2008) 65:154-164).
- Clinical characterisation of ultra-high risk psychosis as a distinct diagnostic entity (**Yung** *Schizophr Res* (2008) 105:10-17).

***Development***:
- Tested anti-inflammatory agents for negative symptoms (*Chaudhry J Psychopharmacol* (2012) 26:1185-93), now funded by 6-centre MRC/NIHR EME trial (**Deakin** £1.7m) and recent £4.2m MRC grant to **Deakin, Williams, Talbot**, based on imaging biomarkers of neurotransmission and inflammation (e.g. *Brain Behav Immun* (2011) 25: 1113-1122).
- Developed and validated smartphone-based ambulant assessment technology (Clintouch) to prevent relapse in patients. Funded by 3 MRC DCS project grants (£2.2m to **Lewis, Bucci**). NHS Confederation is promoting adoption of this technology nationally in association with industry partners. EU FP7 funded project (Optimise, €15m) runs m-health medication management across 22 European centres, led from Manchester.

***Delivery:***
- Demonstrated efficacy of CBT and social anxiety therapy in people with psychosis and a history of violence (**Haddock** *Brit J Psychiatry* (2009) 194:152-7).
- Delivered psychological treatment in prodromal psychosis and psychosis with comorbid substance use (**Morrison**, **Barrowclough** *Addict Behav* (2009) 34:859-66; *BMJ* (2010) 341; *BMJ* (2012) 344; MRC grants totalling £3m).

Translational research focus: Addictions

***Discovery:***
- Showed that drug cues are more salient than other cues in opiate addiction (**Deakin** *J Psychopharm* (2008) 22:836-42). Strategic multicentre MRC addiction grant (**Deakin, Elliott**: £1.9m) on new treatments for addictions, capitalising on imaging methods development research (**Williams** *Human Brain Mapping* (2012) 33:373-86).

***Development:***
- New, brief interventions to reduce hazardous alcohol use (**Armitage** *Health Psychology,* (2011) 30:633-641).
- Community-based second-hand smoke reduction intervention for caregivers of urban children with asthma (**Borrelli** *Health Educ Res* (2013) 28:141-52).

***Delivery:***
- Delivered a volitional help sheet (**Armitage** *Health Psychology* (2008) 27:557-566) in primary care in the UK.
- Evaluated Integrated Drug Treatment System (IDTS) in prisons (**Shaw**, *Senior*), research commissioned by the Department of Health.

Translational research focus: Development and developmental disorders

***Discovery:***
- New mechanism of children's early grammar development (**Lieven** *PNAS* 106:17284-17289).
- Associations between maternal folic acid use and autism spectrum disorder risk. (**Abel** *Am J Psychiatry* (2013) 170:391-8).

***Development:***
- The Computerised Manchester Child Attachment Story Task: a novel tool for assessing attachment (**Green** *Int J Methods Psychiatric Research* (2010) 19:233-42).
- The Manchester Inventory for Playground Observation: an instrument for quantifying peer interactions (**Green** *Res Dev Disabilities* (2011) 32:2458-66).

***Delivery*:**
- Improved access to positive parenting interventions (*Calam Child Maltreatment* (2008)13:347-361).
- Parent-Mediated Communication-Focused Treatment for preschool children with autism (PACT) improves dyadic communication and generalised autism symptom outcomes (**Green** *Lancet* (2010) 375: 2152-2160).

***Strategic goal 4: Implementing translational research with NHS Partners***

The delivery of translational research into health care is coordinated by Manchester Academic Health Sciences Centre (MAHSC). MAHSC, established in 2008, is one of five Department of Health-designated Academic Health Science Centres in the UK. MAHSC brings together UoM and 6 NHS Trusts in a company limited by guarantee with unified research governance, standards, processes and priorities. Mental Health is one of 5 priority areas for MAHSC, mapping directly to IBBMH. These unified, integrative structures allow us to exploit basic science discoveries in cognitive processing and neuroimaging to investigate underlying causes of mental ill health, leading to the development and delivery of improved and innovative treatments in primary and secondary care settings. For this UoA, our principal NHS partners are Manchester Mental Health and Social Care Trust (MMHSCT), Central Manchester Foundation Trust (child and family mental health), Lancashire Care Foundation Trust, Salford Royal Foundation Trust (clinical neurology) and Greater Manchester West Foundation Trust. Forty-eight per cent of returned staff in this UoA also have NHS contracts.

***Strategic goal 5a: Enhancing relationships with industry***

In line with UoM's strategic objective, this UoA has significant engagement with, and income from, industrial partners. This includes the MAHSC m-Health Ecosystem, a partnership including pharma, telecoms and computing companies to accelerate the adoption of mobile-health innovations (e.g., Clintouch £470k **Lewis**) and the Strategic Alliance between AstraZeneca (AZ) and the Centre for Imaging Sciences supporting translational research into imaging biomarkers. AZ has contributed £1.9m to medical imaging research at Manchester and supports a 0.2FTE Chair in Translational Imaging. AZ, Servier, P1Vital, Lundbeck and Sanofi fund research based on novel methods for assessing psychiatric drug effects with fMRI (**Deakin, Anderson, Williams, Elliott**). Ongoing collaboration with Unilever research on modelling consumer behaviour provided >£500K during the assessment period (**El-Deredy**, **Poliakoff**), in addition to a joint Marie-Curie transfer of knowledge award from the EU. UoM's award-winning intellectual property company (UMI$^3$) has facilitated business engagement, for example supporting 3 spinout companies/social enterprises in this UoA (Bioxydyn www.bioxydyn.com/, Storm Skills Training http://www.stormskillstraining.co.uk/ and Safer Services Ltd). We are also establishing links with increasingly important third sector providers of clinical services. For example, Crime Reduction Initiative (CRI), the leading provider of addiction services in the UK, has a research agreement with UoM and their Clinical Director (*D'Agnone*) holds an honorary chair in IBBMH.

***Strategic goal 5b: Patient and public involvement in research***

One of the three strategic goals of UoM's 2020 Strategic Vision is Social Responsibility. Patient and public involvement is fundamental to our UoA strategy, ensuring that our research is relevant, acceptable and valuable to patients. Clinical psychology's community liaison group (*Awenat*, *Pratt*) has received local and national commendation, while the Self Help Therapy and Recovery project (**Barrowclough**) received an NIHR award and the ACT NoW study (**Bowen**) has been nationally recognised as an example of best practice. Public engagement as a pathway to research impact is embedded in UoM infrastructure through the Manchester Beacon for Public Engagement Network and engagement@manchester, facilitating researchers in sharing resources and strategies. This UoA provides online resources, school events and stands at science festivals and science museums. For example, imaging scientists from this UoA contributed to 8 schools events in the 2012-13 academic year, reaching over 1000 students from schools in the North-West.

***Developing strategic goals over the next 5 years:***

As well as maintaining and expanding our portfolio of world-leading translational research in line with the UoM 2020 Strategic Vision and FMHS 5 year strategy, we will also:

1. Increase large-scale collaborative funding applications especially to research councils and major charities (new £4.4m CRUK-EPSRC centre (**Parker**) is an important model) to address priority challenges and to strengthen partnerships with industry (existing m-health Ecosystem and Strategic Alliance with AstraZeneca are key models).
2. Continue to expand on and draw together neurodegeneration and dementia research to ensure that we are in a strong and unique position to bid for MRC centre status for the study of 'Neurodegeneration and dementia: from molecule to care plan' (**Lambon Ralph**).
3. Lead multi-centre collaborative projects in ultra high-risk and early psychosis research (**Yung**).

4. Continue to develop fully translational addictions research programmes. *Neill* (UoA3) has relevant animal models, while our expanded Health Psychology expertise (**Armitage, Borrelli**) provides a unique opportunity to include prevention in our strategy.
5. Secure funding for a state-of-the art regional child research centre (with Liverpool and Lancaster Universities) as a centre of excellence in children's communicative development (**Lieven**, **Theakston**).

**c. People, including:**

**Staffing strategy and staff development**

The delivery of the research strategy relies on high-calibre staff at all levels. Thus, we have:

1. Attracted and promoted established world leaders to provide strategic vision to drive the research agenda.
2. Developed future leaders by using internal and external funding, including junior fellowships, to recruit and facilitate talented early career researchers.
3. Provided training and career development for all academic and research staff using FMHS and UoM infrastructure and programmes.

***1. Attracting and promoting established leaders: senior appointments and promotions***

- In 2011, UoM launched 'Project Diamond', a strategic appointment drive to recruit outstanding academic staff in priority areas. Research in this UoA has particularly benefitted by recruiting world-leading researchers to strengthen our translational research programmes, and facilitate the integration of basic and clinical staff across IBBMH. **Kotz** (from Leipzig) has a world-leading track record in bridging cognitive neurosciences discovery with clinical neuroscience. **Yung** (from Melbourne), is a world leader in prodromal psychosis research and is leading the development of novel early interventions for psychosis for translation into clinic. **Armitage** (from Sheffield), **French** (from Coventry), and **Skevington** (from Bath) will drive FMHS-wide research activity on health behaviour change with emphasis on developing and delivering early intervention and prevention.
- The core teams are augmented by our international links via formal 20% and honorary world-leading senior appointments: McClelland (Stanford), **Beck** (Pennsylvania), Patterson (Cambridge), Saito (Kyoto), **Logothetis** (Max Planck), **Sanders** (Queensland), **Borrelli** (Brown). See *section e: international collaborations*.
- During the assessment period, promotions to chair recognised specific innovations within the translational pipeline: discovery of basic mechanisms (**Pickering-Brown**, **Montaldi**, **El-Deredy**), developing novel interventions (**Anderson**), delivering and evaluating interventions (*Calam,* **Wearden**) and knowledge transfer (**El-Deredy**).

***2. Recruiting and developing future leaders: early career researchers and fellowships***

- We have recruited ECRs with emerging research track records aligned to priority areas, and provided them with mentoring and support to become the future leaders in their fields. Since 2008 we have recruited 16 ECRs (**Birtel**, **Bucci**, **Capek**, **Cloutman**, **Coope, Hoffman**, **Jensen**, **Kyle**, **Leroi**, **McBride**, **McKie**, **Smith**, **Talmi**, **Taylor**, **Warren**, **Yao**). Those appointed earlier in the assessment period have now developed their own grant-funded research programmes and teams (**Bucci** - MRC; **Talmi** - ESRC; **Warren** - Wellcome and ESRC). Additionally, we have secured 5 NIHR-funded clinical lecturer posts. In the current submission 11 FTEs (16%) have ECR status.
- The FMHS 'Stepping Stones' scheme, supported by our Wellcome Trust Institutional Strategic Support Fund and Faculty investment, bridges the career gap between excellent postdoctoral researcher and established independence. Of 19 researchers awarded funding, 80% went on to secure external fellowship funding mostly from NIHR or MRC. In this UoA, Zahn (now MRC Clinician Scientist) and **Hoffman** were supported by the Stepping Stones scheme.
- In addition, FMHS launched the Fellowship Academy to increase the number and quality of external fellowship awards, with funding schemes for researchers to gain the experience, publications and networks to improve external applications. For example, the International Scholars Programme sends researchers to learn new techniques and establish new collaborations (e.g., NIH, Stanford, Mt Sinai, Baylor, Washington).
- Since 2008, we have attracted 9 fellowships in this UoA: **Juhasz** and Symonds (Biomedical Research Centre clinical research fellows), **Berry** and Taylor (NIHR clinical research fellow),

Zahn (MRC clinician scientist), **Hoffman** (MMHSCT Stepping Stones Fellow), Ueno (Japan Society for the Promotion of Science Foreign Fellow), Tamminen (ESRC Postdoctoral Fellow), Robson (Stroke Association Senior AHP Training fellows), and 9 NIHR academic clinical fellows.

***3. Providing training and career development***

- All ECR staff are supported by a career mentor over a 1- 3 year period. In addition, we have established the award-winning Manchester Gold, which is a career mentoring programme for all staff managed by the Staff Training and Development Unit at UoM.
- Annual performance and development review process: all academic staff meet with their academic manager to agree targets, training needs and development goals. In the next two years, we will move to a comprehensive 'Contribution Mapping' approach that accounts for all teaching, research and leadership activities for all academics in line with UoM plans.
- In line with University and Faculty policy, training and development is offered and delivered through targeted programmes of support covering different staff groups.
- Examples of institutional training programmes include:
  - New Academics Programme: a 12-month mandatory programme for all new staff. The programme is accredited by the Higher Education Academy, so that those who successfully complete the programme can seek the status of Registered Practitioner.
  - Research Team Leaders Programme: a highly successful programme to develop and enhance the research leaders of the future. Of the 34 researchers who embarked on the programme 23 were subsequently principal or co-investigators on external funding of £13m.
  - Strategic career and promotions workshops explain the promotion process and essential criteria, identify how to raise researchers' profiles internally and externally, and help develop CVs to build the required evidence for promotion.
- UoM runs a Research Staff Conference that provides up-to-date information and networking opportunities to research staff from across the University and has developed a Concordat Implementation Plan to support the career progression of research staff. This received the Human Resource Excellence in Research Award from the European Commission. The "An Academic Career" website, developed by the UoM Careers Service, is a comprehensive guide to working in higher education and won the Times Higher Education 2011 Award for Outstanding Support for Early Career Researchers. UoM additionally received the 2011 Scopus Fostering Young Researchers Institutional Award from the US-UK Fulbright Commission and Elsevier.

***Equality and Diversity***

- Equality data monitoring and action planning in relation to recruitment, current staff profile and promotion is embedded into UoM's annual performance reviews. Across FMHS in 2012, 88% of female and 75% of male applicants for Chair promotions were successful (73% and 65% respectively for promotion applications at all levels).
- Of the 58 professors, readers and senior lecturers/research fellows returned in this UoA, 29 are female (50%).
- 81% of academic and professional support staff across the Faculty are listed as 'White British', 6% as 'Other White' and 13% as 'Black and Minority'; figures for professorial staff are 80, 14 and 6% respectively.
- The UoM holds a bronze Athena SWAN charter that promotes the advancement of women in Science and Engineering. Within FMHS, all teaching schools and research institutes have achieved at least bronze status, with the target of silver by 2015.
- The UoM has been awarded the "Two Ticks" disability symbol, a guaranteed interview scheme for disabled job applicants who meet the essential job criteria. The University has a dedicated support service for disabled staff, with two posts to ensure that disabled staff and applicants receive the high-quality confidential support that they require to access their jobs. UoM is one of a small group of institutions taking part in the Equality Challenge Unit's Black and Minority Ethnic Systemic Change Pilot.

***Staff survey***

In order to meet its Manchester 2020 goals, UoM ensures that it is an institution where staff feel encouraged, valued and motivated. The University commissioned Capita Surveys and Research to

conduct its 2013 staff survey. The response rate was 71%. A summary of the positive results across all staff for this UoA are provided here, showing the % who endorsed each statement listed.

| Question | **UoM %** | **UoA4** % |
|---|---|---|
| The University is a good place to work | 94 | 94 |
| I agree with the University Core Goal to support world-leading research | 97 | 97 |
| Did you agree clear objectives as part of your performance and development review/probation review? | 87 | 86 |
| I feel there are sufficient training and development opportunities available to me to do my job more effectively | 75 | 76 |

**Research students**

Over the assessment period there has been significantly increased investment by both UoM and FMHS in PhD recruitment. The Manchester Doctoral College oversees all aspects of the University's doctoral training and research staff development, integrating postgraduate research support with research career development at an institutional level. Each student has at least two academic supervisors and an advisor to provide comprehensive support. The individualised online progression monitoring system, eProg, provides all research students with a clear direction on critical milestones, recording evidence for their engagement with training, progress and personal development. This successful system has been commercialised as "Progress Platform" and contracts have already been signed with three other HEIs. The President's Doctoral Scholar (PDS) Award is a flagship funding scheme, started in 2012, underpinned by a core investment of £2.5m over four years. It offers elite studentships to 10% of newly-appointed research students who demonstrate academic excellence and leadership potential. In this UoA:

- 144 PhDs, 18 MPhils, and 12 MDs awarded since 2008. 95% completion rate over 4 years.
- 59 of these PhD students were funded by RCUK. 8 industrial CASE awards in partnership with Unilever, GE Healthcare, Astra-Zeneca, GSK, and Johnson & Johnson. An example of technological development is the correlation of imaging and behavioural biomarkers in a transgenic mouse model of Alzheimer's disease, undertaken in collaboration with GSK (Forster *Magn Reson Med* (2013) 69:944-955).
- 102 students are currently registered for PhDs, 70 DClinPsych, 6 MPhils and 6 MDs.
- 7 PDS awards in 2012 and 9 in 2013, the largest share in any UoA in the University.
- On average, 1.8 journal outputs per student are published or in press by graduation.
- 82% of postgraduate research students moved on to full-time employment within 6 months.
- Research students are encouraged to apply for travel grants from a dedicated fund to present work at conferences. For example, at 2010 Human Brain Mapping meeting there were 35 presentations (>1% of the meeting) and 50 delegates from UoM, mostly research students.
- Research students are encouraged to participate in public engagement events. Many research students in this UoA take part in the organisation and running of Brain Awareness Week, FMHS Open Day and the UoM Science Spectacular during the Manchester Science Festival.
- A postgraduate student forum raises views and concerns with the IBBMH Senior Management Teams through the Directors for Postgraduate Education.

**d. Income, infrastructure and facilities**

***Key income***

Over the assessment period the UoA secured £68m of research income. Research has been supported by grants and personal awards from MRC, BBSRC, EPSRC, ESRC, The EU, NIH (USA), NSF (USA), NIHR (Programme Grants, Research for Patient Benefit and Health Technology Assessment Board), Health Protection Agency, Technology Strategy Board Department of Health, Chief Scientists Office Scotland, Health Research Council of New Zealand British Academy, Stroke Association, Wellcome Trust, Dunhill Medical Trust, Arthritis Research UK, Parkinson's UK, Diabetes UK, British Renal Society, MacMillan Cancer Support, ExtraCare Charitable Trust amongst others charities. Highlights include:

- Two MRC programme grants (**Lambon Ralph**: 2007-12, £807k; 2013-18, £2m); a cross council "Cognitive Foresight" programme grant (**Welbourne** and **Lambon Ralph**:

EPSRC/MRC/BBSRC 2008–13, £930k); and an HTA RCT (**Bowen** et al: £1.5m, +£416k DH Subvention and £104k Stroke Association; 2004-10).

- A total of £8m (across **Burns**, **Gerhard**, **Herholz**, **Mann**, **Pendleton**, **Pickering-Brown**) supporting basic and clinical research on dementia and neurodegeneration has been awarded by the European commission FP7 and FP6 (£1.25m), MRC, ARUK and other research councils (£3.6m), UK Charities (£2.2m), UK hospitals, central government and industry (£650k) and non EU funding (£230k).
- A total of £6m (across **Anderson**, **Deakin**, **Elliott)** supporting cognitive neuroscience research in mental health and psychosis, awarded by MRC and NIHR.
- MRC challenge grant of £4.2m (**Deakin, Talbot, Williams)** to explore glutamate and GABA function in psychosis.
- 4 NIHR programme grants for applied research in psychological treatments (**Morrison**), early psychosis (*Marshall*), suicide (*Kapur* (UoA 2)) and health behaviour (*Guthrie*).
- International grant from Swedish Research Council to examine the long term effects of two parenting interventions on children's mental health (*Calam*, £3m).

***Infrastructure and facilities***

- The University is continuing to undertake a major programme of updating facilities and building new facilities in an ambitious University Estates plan, with a £700m Phase 1 to 2018 and a further £300m investment to be made by 2023. This UoA has benefitted through relocating staff together on the central campus of the university buildings (e.g. the Jean McFarlane Building, opened 2009, with infrastructure for desk-based research, and the Zochonis Building, major upgrade 2013, including a student hub). Over the next 10 years, further investment by UoM will create a state of the art Biomedical Campus, with direct benefits for this UoA.
- As part of UoM's strategic vision of world-leading research, there has been significant investment in infrastructure for securing and managing research funding. The University Research Office provides cross-Faculty support for research, including a specialist EU Office, compliance and risk management, research governance and data protection. Specific research management for this UoA is provided by FMHS, with an Associate Dean for Research and a Deputy Dean for Strategy who are supported by a Faculty Research Office with 9 FTE administrative staff. Research Business Management is provided by an integrated operational structure of 20 FTE Research Support and Finance Managers. Research intelligence and strategic support is provided by a Research Deanery comprising 7 research co-ordinators (one with a particular remit to support IBBMH) and 3 administrators. This research management structure is designed to facilitate large scale research grants which are integral to the ambitious translational research strategy of this UoA.
- Neuroimaging is a key underpinning methodology for the strategy of this UoA. UoM, with RCUK and industry support, has continued to develop facilities to support internationally competitive clinical and pre-clinical imaging research, which underpins basic science discovery for translation. Researchers in this UoA carry out >50% of the imaging activity undertaken on the University's 3 research-dedicated human MR scanners, 2 human PET scanners and two pre-clinical scanners (MRI and PET). Since 2008, a new 1.5T MR scanner, a new clinical PET/CT and a pre-clinical PET/CT have been installed at the Wolfson Molecular Imaging Centre (WMIC), with support from University Strategic Investment and AstraZeneca (£400k). The WMIC is one of only two UK academic centres with the capability to generate a full range of PET ligands. UoM's 3T MR scanner at Salford Royal Hospital was upgraded and in 2012 the 1.5T MR scanner at the Wellcome Trust Clinical Research Facility was replaced with a 3T scanner with financial support from NIHR (£600k) and University Strategic Investment. In 2010, the 7T pre-clinical MR scanner on the central campus was upgraded with support from BBSRC (£220k) to provide a new state-of-the-art console with the existing magnet.
- The NIHR/Wellcome Trust Manchester Clinical Research Facility was established in 2001 and refunded by NIHR for 5 years in 2012. It continues to support this UoA's clinical studies with its comprehensive research environment, skilled clinical research workforce, and well-equipped facilities: 3T MR scanner; EEG; human performance laboratory; and analytical laboratory.
- UoM is a member of the North-West Mental Health Alliance, a joint initiative with the Universities of Liverpool and Lancaster to share facilities and resources to enhance mental health research and treatment in the North-West of England.

- All staff have access to the UoM Library, a designated National Research Library, offering a range of tailored products and services to underpin research. This includes IT facilities, providing access to an unparalleled range of electronic resources including over 40,000 e-journals and a complete range of research databases. They also host Manchester e-Scholar, which is a premium resource for both depositing and disseminating research outputs.

***Research governance policy and practice***

Principles, standards and regulation of good practice surrounding the conduct of research are governed by the University's Code of Good Research conduct. Developing and monitoring University policy on research governance integrity and ethics, and providing guidance and support is overseen at executive level by an Associate Vice-President who is also an advisor to the Health Research Authority (HRA). The UoM Good Research Practice web site provides advice and information for staff and students. At Faculty level a Research Practice Coordinator and two team members work closely with the Faculty Training Team to deliver training sessions on ethics and research governance to staff and students. The Faculty provides on-line Good Clinical Practice training, in conjunction with CMFT. The MAHSC Research Office harmonises research management and governance procedures between partner Trusts and FMHS.

**e. Collaboration or contribution to the discipline or research base**

The global health questions pertaining to mental health and neurodegeneration require global collaborative effort. Since 2008, we have capitalised on the multi-disciplinary Neuroscience Research Institute and Biomedical Imaging Institute to facilitate building networks and developing collaborations with leading national and international centres, with a priority to secure RCUK and EU funding for large multi centre-studies. The overarching University of Manchester Research Institute provides seed-corn funding (around £1m pa) to support new interdisciplinary collaborations. Networks and funding applications are supported by the dedicated UoM and faculty structures (*section d*). Examples of collaborations with significant funding and outputs:

***Strategic collaborations: international***

**Abel** and *Webb (*UoA2*)* collaboration with Columbia University, USA, Aarhus, Denmark and Karolinska Institute, Sweden, ERC funding €1.5m: *Arch Gen Psych* (2010) 67:69-77; 67:923-930; *Am J Psychiatry* (2013) 170:391-398; *Psych Med* (2013) 43:2057-2066.
**Elliott** collaboration with University of Copenhagen: *Neuropsychopharm* (2013) 6:996-1005; *Neuroimage* (2013) 83:35-44.
**Lieven** and **Theakston** longstanding collaboration with the Max Planck Institute for Evolutionary Anthropology, Leipzig (£1.9m): *PNAS* (2009) 106:17284-9; *J Child Language* (2009) 36:1091-14; *Cognitive Science* (2012) 36:1268-1288.
**Herholz** Centre for Alzheimer's, Brescia, Italy: *Neurology* (2013) 81:487-500; *J Nucl Med* (2012) 53:592-600. InMIND project: a unique consortium of 27 partners from 12 European countries.
**Kotz** collaboration with Tufts University, USA (Max Planck Inst. funding): *Behavioural Brain Research* (2011) 216:685-691. Collaboration with INSERM Lyon, France (Funding: Deutsche Forschungsgemeinschaft, Gemany and Agence Nationale Recherche, France). Collaboration with McGill, Canada (funding: Canadian Institutes of Health Research and Parkinson Society): *Cognition & Emotion* (2011) 25:834-853; *J Phonetics* (2009) 37:417-435.
**Parker** FP7 CONNECT Consortium of Neuroimagers for the Non-invasive Exploration of brain Connectivity and Tracts (www.brain-connect.eu): *Neuroimage* (2011) 56:1301-1315.

Global health is one of the FMHS cross-cutting research themes. **Skevington** was a member of UNESCO Gender and HIV review committee (2009-2011); and Expert panel member on 'Indicators of health & well-being of communities dependent on biodiversity' of the United Nations Environment Programme. **Deakin,** *Edge* (UoA3) and **Husain** have key research links with Pakistan, Kenya, Brazil and the Caribbean (*Arch Gen Psych* (2008) 65:154-164; (2012) 69:1014-1021; *J Psychopharm* (2012) 43:285-289).

In addition, the iconic and honorary appointments of world-leading senior researchers (see also *section* c) facilitate international collaborations with their home institutes (Brown; Kyoto; Max Planck; Pennsylvania; Queensland; Stanford). Example outcome: **Lambon Ralph** and **Welbourne** with McClelland (Stanford) and *Furber* (UoA11), Cognitive Foresight Cross-Council (EPSRC/MRC/BBSRC 2008–13, £930k); *J Cogn. Neurosci*. (2013) 25, 2107–2123.

***Strategic collaborations: national***

Since 2008, we have secured collaborative research grants, and produced joint outputs with a large number of UK HEI's including the Universities of Cambridge and Oxford, University College London, King's College London and Imperial College, London. For example, MRC "New drugs for addiction" (**Deakin**, **Elliott**) is £1.9m collaboration between Imperial College University of Cambridge and UoM. NIHR programme grant on effectiveness of perinatal mental health services (UoM **Abel)** is a collaboration with Institute of Psychiatry, KCL. UoM (**Parker**) is one of 3 UK institutions (with UCL and Oxford) who are partners in the EU-wide CONNECT project.

***Contribution to the discipline***

***Leading policy roles***

**Appleby:** NHS National Director for Mental Health (2007-11).
**Appleby:** National Clinical Director for Offender Health (2011-13).
**Burns:** National Clinical Director for Dementia Services, England (2011-present).

***Fellowships, directorships, honorary positions***

**Deakin**: Fellow of the Academy of Medical Sciences and American College of Neuropsychopharmacology, NIHR Senior Investigator (2009-13).
**Herholz**: Fellow Royal College of Physicians, Royal Society of Medicine and Society of Biology.
**Kotz**: Honorary Professorship in Experimental Psychology, University of Leipzig (2010-present); MaxNetAging Research Fellow, MPI for Demographic Research, Rostock (2009).
**Lambon Ralph**: Fellow (hons) Royal College of Speech & Language Therapists (2003-present); Fellow British Psychological Society (2012 onwards); NIHR senior investigator (2008-14; re-elected 2011); Hilgard Visiting Professor at Stanford University (2012), Appointed Governor of Salford Royal Foundation Trust (2009-11).
**Lewis**: elected to Academy of Medical Sciences 2008, Chair of Sectional Subcommittee 6 2009-12, NIHR Senior Investigator (2008-12; re-elected 2012-16).
**Lewis**: Associate Director, NIHR MHRN.
**Logothetis**: Director of the Max Planck Institute for Biological Cybernetics, Tübingen, Germany; member of US National Academy of Sciences.
**Mann**: Visiting Professor in Neuroscience, Beijing University of Chinese Medicine.
**Pickering-Brown**: MRC Senior Non-Clinical Fellowship, visiting Professor of Neuroscience, Beijing University of Chinese Medicine.
**Williams**: Honorary Professor UCL; Honorary Dozent, University of Kuopio, Finland.

***National/international advisory boards and committees***

**Anderson:** chaired NICE guidelines Development Group to update Clinical Guidelines for Depression, author of resulting NICE Guidelines, MRC College of Experts Neuroscience Board.
**Appleby**: National Suicide Prevention Advisory Group, Member, Independent Commission on Policing and Mental Health in London.
**Burns**: founder member, European Dementia Consensus Network (EDCON), Member HTA Clinical Trials Board.
**Deakin:** Chair of the Scientific Committee of the European College of Neuropsychopharmacology, co-chair of CINP Fellowship and Awards Committee.
**Elliott**: scientific advisory board to Centre for Integrated Molecular Brain Imaging, Copenhagen.
**Green**: member of the NICE Guideline Development Group: Treatment for Autism in children and young people; the Quality Standards Advisory Committee for Autism Intervention.
**Lambon Ralph**: Chair of Higher Education Academy PRES Advisory Group (2012- present), ERA-NET ERASysBio Scientific Advisory Board (2009).
**Logothetis**: member of the Advisory Boards of: McGovern Institute, M.I.T.; Brain and Cognitive Sciences, M.I.T.; IGPS, Freiburg; Centre of Excellence in Systems Neuroscience of the Academy of Finland, Helsinki; Brain Imaging Center, Frankfurt am Main; ICM-ADREC, Paris; Brain Center of the Hebrew University, Jerusalem; Brain Research Center of the Weizmann Institute, Jerusalem.
**Mann**: Scientific Advisory Board Motor Neurone Disease Association, MRC Brain Banking Strategy Group, Brains for dementia Research Joint Management Steering Group.
**Parker**: member of International Advisory Panel for the NIH Human Connectome Project.
**Pendleton**: Clinical advisor: Parliamentary and Health Services Ombudsman, England and Wales.
**Pickering-Brown**: RC Cognitive Function and Ageing Study Biological Resource Advisory Committee; Scientific Advisory Board Alzheimer's Research UK; Health Research Board Ireland.

**Skevington**: Advisor to UNAIDS, Member of UNESCO Gender and HIV review committee, Member of the United Nations Environment program panel on health and wellbeing.
**Smith:** member of the Maternity MEND Steering Group and Expert Advisor and member of the Expert Committee Panel for Tommy's Charity.
**Talbot**: Brain Imaging Council Board of Directors, Society of Nuclear Medicine and Molecular Imaging, USA (2012-14).
**Wearden**: member of the MRC/NIHR EME Programme college of experts and Chair of the Programme Steering Committee for the NIHR programme grant SUPA project.

***Grant panels***
**Deakin**: ERC Advanced Grants, Lister Institute Research Prizes, NIHR Fellowships.
**French**: member of the College of Experts and methodological expert and sub-panel member for the NIHR Programme Grants for Applied Research stream.
**Green**: Health Technology Assessment Programme Commissioning Board.
**Hill:** MRC Neurosciences and Mental Health Board member (2009-12).
**Kotz**: panel member Academy of Finland, Cognitive Neuroscience Section (from 2012), ERC Panel Member for the SH4: The Human Mind and its complexity (from 2010).
**Lambon Ralph**: MRC Neurosciences Panel for specialist postdoctoral training programmes in PET imaging (2012-13), MRC Centenary Award Panel Member (2012), MRC Non-Clinical Training and Career Development Panel Member (2011-15) Indian Council for Medical Research and UK Medical Research Council Joint Initiative (Review Panel 2010-11), Royal Society Dorothy Hodgkin Fellowship Selection Panel (2011-13), ESRC Assessor College (from 2008).
**Lewis**: MRC Neurosciences and Mental Health Board (2006-9).
**Pickering-Brown**: MRC Neuroscience and Mental Health Board (2013-16).
**Skevington**: panel member and Expert Evaluator on the European Union Framework 7 Public Health Research grants Panel.
**Wearden**: member of the NIHR Research for Patient Benefit NW Regional Funding Panel.
**Williams**: member of EPSRC Review College and Engineering Fellowships Panel.

***Senior roles in learned societies***
**Burns**: member, Board of Directors, European Association for Geriatric Psychiatry.
**French**: Chair, Scientific Committee: Division of Health Psychology annual conference (2011-13).
**Herholz:** President of Society of Nuclear Medicine -Brain Imaging Council.
**Kotz**: Society for the Neurobiology of Language (Chair nomination committee from 2012), Founding member of the European Society for Cognitive and Affective Neuroscience (from 2011).
**Lambon Ralph**: Vice-President British Aphasiological Society (2002-5), President British Neuropsychological Society (2010-12).
**Lewis**: Chair, Sectional Subcommittee 6, Academy of Medical Sciences (2009-12).
**Lieven**: President of the International Association for the Study of Child Language (IASCL) (2008-11), Chair of the Board of Trustees of IASCL (from 2011).
**Parker:** Steering, educational and scientific programme committees of the International Society of Magnetic Resonance in Medicine.
**Wearden**: Chair Elect/Chair/Deputy Chair of the British Psychological Society, Division of Health Psychology (2009-11), Chair of the CFS/ME Clinical and Research Network (2007-9) and Assistant Chair of the British Association for Chronic Fatigue Syndrome/ME (2009-10).

***Senior editorial roles in leading journals***
**Armitage**: Associate Editor for the British Journal of Psychology and Psychology and Health.
**Burns**: Editor of The International Journal of Geriatric Psychiatry.
**Deakin**: Editor in chief European Archives of Psychiatry and Clinical Neuroscience.
**French** and **Wearden**: Editors of the British Journal of Health Psychology.
**Herholz**: Editor European Journal of Nuclear Medicine and Molecular Imaging.
**Kotz:** Cognitive Neuroscience section editor, Neuroimage.
**Logothetis**: Receiving Editor for the European Journal of Neuroscience (EJN), Associate Editor for Trends in Cognitive Sciences (TICS), Neuron, Current Biology, Current Opinion Neurobiology.
**Parker**: Deputy Editor of Magnetic Resonance in Medicine.
**Shaw**: Editor Journal Forensic Psychiatry and Psychology.
**Williams**: Handling Editor, Journal of Neurochemistry.