Institution: Heriot-Watt University

Unit of Assessment: UoA4 Psychology, Psychiatry and Neuroscience

Title of case study: What keeps us sharp? Increasing public awareness of the lifestyle factors promoting brain health

Period when the underpinning research was undertaken: Jan 2013 to Dec 2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Alan Gow	Professor	Jan 2013 – Present
Eleftheria Vaportzis	Research Associate	Nov 2014 - Dec 2018
Malwina Niechcial	Research Assistant	Jan 2017 - Dec 2019

Period when the claimed impact occurred: 2014 to Dec 2020

Is this case study continued from a case study submitted in 2014? No

1. Summary of the impact

With 1 in 5 of the UK population aged 65 and over, rising to 1 in 4 by 2050, promoting healthy ageing is a priority. People rate age-related changes in thinking skills as a key concern. Heriot-Watt research investigates lifestyles and behaviours that protect or harm brain health. We directly engaged the public with our findings via local workshops and national events to improve their understanding of 'brain healthy' lifestyles. We reached wider audiences, numbering hundreds of thousands and millions across activities, via contributions to radio/TV and third sector outputs that raised awareness of brain health and what supports it.

2. Underpinning research

Two research approaches underpin the impact:

1) Identifying lifestyle and behavioural factors associated with better, or worse, cognitive ageing trajectories from large, longitudinal studies. Findings suggest that individuals who are more physically active or socially engaged have a higher level of cognitive ability or less decline in old age, while more mentally challenging activities may be more important in developing capacity during midlife [3.1, 3.2, 3.3, 3.4];
2) Assessing public understanding of cognitive ageing, including knowledge of potential lifestyle determinants, by conducting the largest UK-wide brain health survey. While the majority (90%) believed maintaining brain health with age was possible, fewer than 60% were sure what might be protective [3.5].

Much of the longitudinal research has been conducted by collaborating with national and international research centres at the Universities of Edinburgh and Copenhagen. Participants in these studies completed a mental ability test when aged 11, and decades later were recruited into follow-ups to examine change across their 70s, 80s and 90s [3.1, 3.2]; another sample was recruited at age 50 and followed for up to 40 years [3.3, 3.4]. Unique contributions include being able to account for cognitive changes across the whole lifespan from childhood to late adulthood, or having detailed cognitive data over many decades in old age.

Those findings supported the development of translational research within The Ageing Lab at Heriot-Watt. Based on lifestyle factors that appear to protect cognitive abilities (including social connections or novel engagement), we developed intervention projects. In one example, people with no previous computing experience learned to use a tablet computer in a 10-week class-based programme to assess the effect of engaging in an entirely new and relatively demanding activity; participants in the intervention group showed improvements in processing speed [3.6]. The work supported the viability of real-world activities as cognitive interventions and has extended to a larger activity-based intervention study. Our Intervention Factory project assessed a range of new learning or novel engagement activities within community-based settings for their potential to maintain or improve cognitive health, in partnership with key stakeholders including Age Scotland and Age UK, Edinburgh Council, NHS Lothian, Education Scotland, and the Scottish Older People's Assembly.

The Ageing Lab also conducted a public attitudes survey exploring people's understanding of, and beliefs about, cognitive ageing. Supported by Age Scotland and Age UK, the "What Keeps You Sharp?" survey was completed by >3,300 people aged 40-98. It represented the first, and remains the largest, UK-wide survey on beliefs about brain health [3.5]. The findings revealed that the majority of respondents were optimistic about the opportunity to maintain or improve brain health with age, though fewer were sure what might be beneficial. When given lifestyle factors to consider, those selected as most important for brain health were generally in agreement with research evidence, however, few reported participating in those activities to specifically support their brain health. The survey findings underpin the impact activities below, as a means of starting discussions about cognitive ageing and what people might do in terms of 'brain healthy' lifestyles.

3. References to the research

(IF = impact factor)

[3.1] Gow, AJ, Pattie, A & Deary, IJ 2017, 'Lifecourse activity participation from early, mid, and later adulthood as determinants of cognitive aging: The Lothian Birth Cohort 1921', *The Journals of Gerontology: Series B*, vol. 72, no. 1, pp. 25-37. https://doi.org/10.1093/geronb/gbw124
IF = 3.4

[3.2] Gow, AJ, Corley, J, Starr, JM & Deary, IJ 2013, 'Which social network or support factors are associated with cognitive abilities in old age?', *Gerontology*, vol. 59, no. 5, pp. 454-63. https://doi.org/10.1159/000351265
IF = 3.5

[3.3] Gow, AJ & Mortensen, EL 2016, 'Social resources and cognitive ageing across 30 years: the Glostrup 1914 Cohort', *Age and Ageing*, vol. 45, no. 4, pp. 480-486. https://doi.org/10.1093/ageing/afw070
IF = 4.9

[3.4] Gow, AJ, Avlund, K & Mortensen, EL 2014, 'Leisure activity associated with cognitive ability level, but not cognitive change', *Frontiers in Psychology*, vol. 5, 1176. https://doi.org/10.3389/fpsyg.2014.01176
IF = 2.1

[3.5] Vaportzis, E & Gow, AJ 2018, 'People's beliefs and expectations about how cognitive skills change with age: Evidence from a UK-wide aging survey', *American Journal of Geriatric Psychiatry*, vol. 26, no. 7, pp. 797-805. https://doi.org/10.1016/j.jagp.2018.03.016
IF = 3.4

[3.6] Vaportzis, E, Martin, M & Gow, AJ 2017, 'A Tablet for Healthy Ageing: The effect of a tablet computer training intervention on cognitive abilities in older adults', *American Journal of Geriatric Psychiatry*, vol. 25, no. 8, pp. 841-851. https://doi.org/10.1016/j.jagp.2016.11.015
IF = 3.4

4. Details of the impact

From our UK-wide survey [5.1], changes in brain health are among the greatest fears about ageing. Our impact activities increase awareness of cognitive ageing, with people benefitting from hearing how lifestyle might affect brain health in engaging and interactive ways. We do this by: 1) directly engaging with the public; 2) working with national and international third sector partners to support their messaging; 3) engaging the public via the media. Our activities reached tens of thousands via materials we developed for Age UK for example, and millions via contributions to the BBC's flagship radio/TV science programmes, acknowledged by national and international awards for public engagement and impact, including Gow winning the British Psychological Society's Public Engagement and Media Award and being Runner-up in the Nature Research Awards for Driving Global Impact 2019 [5.2, 5.2a].

1) Directly engaging with the public: Our research forms the basis of diverse public engagement activities, ranging from workshops with older people's groups to performances at national events. We have appeared at the Edinburgh Festival Fringe as part of Edinburgh Beltane's Cabaret of Dangerous Ideas since 2014. Audience numbers were among the highest in the programme (584 over 8 shows), with positive audience feedback and reviews (including *Lancet Neurology*). The producer highlights specific impact in attracting non-traditional audiences and 39% having learned something new [5.3]. These events have reached further audiences, including: Royal Society of Edinburgh-hosted talks in Dumfries, Edinburgh, Inverness, and Irvine Bay; British Science Festival (Swansea); ESRC/Age UK event (York); Pint of Science (Edinburgh); Glasgow International Festival; and Glasgow Comedy Festival. We estimate the reach of these direct engagement events at ~1200 people across England, Scotland, and Wales. We conducted an "Ask Me Anything" Facebook Live on brain health, reaching 3,500 people and hosted Brain Health Day at Heriot-Watt University, an opportunity for the public to hear directly about our research. That event attracted over 300 attendees and evaluation suggested most (80%) had not attended events at the university before; the majority were very satisfied with the range (96%) and quality (97%) of the talks and opportunities to engage with the speakers and research team (84%), while 98% learned something new.

2) Working with national and international third sector partners: We produced an accessible lay report of our UK-wide survey [5.1], distributed to more than 3,500 individuals in hard copy, mainly via our Age Scotland and Age UK partnerships at their local and national conferences and training. Age Scotland include the lay summary in their Planning for Your Future, Preparation for Retirement, and Early-Stage Dementia training programmes. "What Keeps You Sharp?" presentations and workshops were hosted at Age UK and Age Scotland national conferences (Perth and London respectively), with attendees representing the public, health and social care professionals, third sector and policymakers. These partnerships extend

the reach of our research; the "What Keeps You Sharp?" lay summary is also included on Age UK's Staying Sharp webpages, a key brain health resource.

In addition to our third sector partners' endorsement and use of our work, we produced content for them. On Age UK's Staying Sharp webpages, we produced the page on aspects of mentally challenging activities and brain health [5.4]. To help people engage with those pages, our UK-wide survey questions were the basis of a new quiz, 'How well do you know your brain?' [5.5], launched during Brain Awareness Week in 2019, with >47,000 impressions/reach in the launch week.

We contributed to the Global Council on Brain Health, an independent organization from the American Association of Retired Person (AARP; a US-based non-profit with ~40,000,000 members) and in collaboration with Age UK, to provide trusted information on how all of us can maintain and improve brain health. The 2017 report and accompanying infographic [5.6], available in English, Spanish, French, Chinese and Arabic, was disseminated internationally. The report was showcased in AARP member publications, the two largest-circulation publications in the US, reached over 1,600,000 via media coverage, and underpins ongoing AARP work as social connection is one of their "six pillars of brain health" [5.7].

3) Engaging the public via the media: Our research was the foundation for "How to Stay Sharp", an episode of BBC Radio Scotland's Brainwaves series [5.8, 5.8a], with a follow-up interview on BBC Radio Scotland's Personal Best [5.9], with a reach of 910,000 during broadcast and two further repeats. Underpinning research was discussed as part of a BBC Radio 4 series [5.9, 5.10] and most recently, we contributed to a BBC Horizon programme on intelligence [5.11, 5.11a], contributing independent input on lifestyle and the ageing brain. The broadcast was viewed by 1,700,000 people when first broadcast, "a reach well beyond the average impact for a television programme" [5.12].

5. Sources to corroborate the impact

[5.1] Gow, A. J. (2018). What Keeps You Sharp? A national survey about what people think about their thinking skills.

[5.2] BPS Public Engagement and Media Award 2016 https://beta.bps.org.uk/news-and-policy/psychologist-who-has-appeared-edinburgh-fringe-wins-award-society

[5.2a] Runner-up in Nature Research Awards for Driving Global Impact 2019 https://www.nature.com/articles/d41586-019-03550-z

[5.3] Letter of support – Producer, Cabaret of Dangerous Ideas.

[5.4] Exercise for the brain? Part of Age UK's Staying Sharp series: https://www.ageuk.org.uk/information-advice/health-wellbeing/mind-body/staying-sharp/looking-after-your-thinking-skills/exercise-for-the-brain/

[5.5] How well do you know your brain? Quiz as part of Age UK's Staying Sharp resources: https://www.ageuk.org.uk/information-advice/health-wellbeing/mind-body/staying-sharp/how-well-do-you-know-your-brain/

[5.6] Global Council on Brain Health (2017). “The Brain and Social Connectedness: GCBH Recommendations on Social Engagement and Brain Health.”

[5.7] Letter of support – Senior Vice President, Policy & Brain Health, AARP/Global Council on Brain Health.

[5.8] BBC Radio Scotland Brainwaves, presented by Pennie Latin: How To Stay Sharp (broadcast 7 and 11 February 2018), listen at http://www.bbc.co.uk/programmes/b09qqmfg

[5.8a] Summary of BBC Radio Scotland Brainwaves, 2018 http://www.bbc.co.uk/programmes/articles/3tlcDfjmfP0zRdbLHwTZZzJ/steps-we-can-take-now-to-keep-our-brains-sharper-for-longer

[5.8b] BBC Radio Scotland Personal Best, presented by Gillian Russell: Couples' Coaching Cards & Growth Mindset (broadcast 12 and 17 February 2018), listen at http://www.bbc.co.uk/programmes/b09rk6s7

[5.9] BBC Radio Scotland Personal Best, presented by Gillian Russell: Giving and Receiving (broadcast 17 and 22 December 2018), listen at https://www.bbc.co.uk/programmes/m0001mxz

[5.10] Letter of support – Producer, BBC Brainwaves.

[5.11] BBC Radio 4 How To Have A Better Brain, presented by Sian Williams: Episode 1 Exercise (broadcast 17 August 2015, and 16 October 2017) http://www.bbc.co.uk/programmes/b065ssr8

[5.11a] BBC Horizon: The Great British Intelligence Test (broadcast 4 May 2020), watch at https://www.bbc.co.uk/programmes/m000hy39

[5.12] Letter of support – Science Producer, BBC Scotland.