

Bristol Neuroscience Newsletter

October - December 2020



What makes memories so detailed and enduring?

Personal memories of the COVID-19 pandemic are likely to be etched in our minds with clarity, distinct from other memories. The process which makes this possible has eluded scientists for decades, but new research has made a breakthrough in understanding how memories can be distinct and long-lasting.

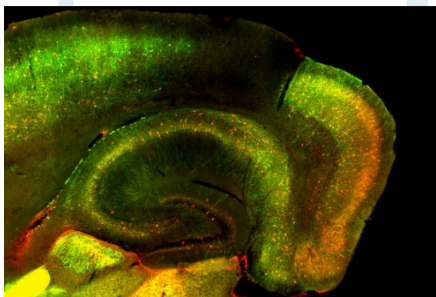
from the brain are made stronger. This process has been associated with changes to connections that excite neighbouring nerve cells in the hippocampus. These excitatory connections must be balanced with inhibitory connections, which dampen nerve cell activation.

tion of memory representations.

The findings uncover for the first time how two different types of inhibitory connections (from parvalbumin and somatostatin expressing neurons) can also vary and increase their strength, just like excitatory connections. Computational modelling demonstrated how this inhibitory learning enables the hippocampus to stabilise changes to excitatory connection strength, which prevents interfering information from disrupting memories.

Udakis M *et al.* (2020). [Interneuron-specific plasticity at parvalbumin and somatostatin inhibitory synapses onto CA1 pyramidal neurons shapes hippocampal output](#). *Nature Communications*.

Image credit: Matt Udakis



The study describes a newly discovered mechanism of learning in the brain shown to stabilise memories and reduce interference between them and provides new insight into how humans form expectations and make accurate predictions about what could happen in future. Memories are created when the connections between the nerve cells which send and receive signals

ty, for healthy brain function. The role of changes to inhibitory connection strength had not previously been considered and the researchers found that inhibitory connections between neurons can similarly be strengthened. Working together with computational neuroscientists at Imperial College London, the team showed how this allows the stabilisation



@BristolNeurosci



bristol.ac.uk
/neuroscience



b-n@bristol.ac.uk



+44 117 428 4012

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EVENTS

From Data to Metadata - Ensuring reproducibility in biomedical research

22 October 2020, 13.15 - 16.45, online

The ups and downs of machine learning for prosthetic control

23 October 2020, 14.00 - 15.00, Kianoush Nazarpour (Reader in Biomedical Artificial Intelligence, University of Edinburgh), online

Quality and Peer Review free workshop for ECRs

23 October 2020, 14.30 - 17.00, online

Neural language models and human reading behaviour

23 October 2020, 15.00 - 16.00, Stefan Frank (Radboud U. Nijmegen), online

Neuromatch Conference

26 - 30 October 2020, online

The impact of Covid-19 on the mental health of children and young people

27 October 2020, 16.00 - 17.00, Prof Tamsin Ford (University of Cambridge), online

Living systematic review into the effect of COVID on suicidal and self-harm behaviour

29 October 2020, 11.00 - 12.00, Prof David Gunnell, Dr Emily Eyles, Lena Schmidt and Luke McGuinness (University of Bristol), online

Acute stress usurps prefrontal cortex circuit function through mGlu5-dependent plasticity on somatostatin interneurons

29 October 2020, 15.00 - 16.00, Max Joffe (Conn lab at Vanderbilt University, USA), online

Good Grief Festival

30 October - 1 November 2020, online

Bristol Neuroscience are delighted to host an online

Bristol Brain Research Day

on 14 January 2021

The day will comprise **sessions themed around BN's research Hubs: Mental Health, Memory, Movement, Neural Computation and Sleep** with a series of invited talks by Bristol researchers in each area

Keynotes:

Prof Eve Marder (Brandeis University, USA)

Prof Sir Michael Owen (Cardiff University)

[View the programme](#)

[Register for your FREE place](#)

FULL EVENTS LISTINGS ARE AVAILABLE ON THE **[BN WEBSITE](#)**

NEWS

BN's new Neural Computation Research Hub

Bristol Neuroscience is delighted to announce the formation of a fifth research hub in [Neural Computation](#). Led by [Conor Houghton](#) (School of Computer Science, Electrical and Electronic Engineering and Engineering Maths, pictured) and supported by a steering group comprising early career researchers, clinicians and principal investigators from across three faculties, the



hub will provide strategic direction for computational neuroscientists across the University of Bristol.

Members of the hub apply computational and mathematical approaches to the study of the brain and, in the other direction, seek to uncover insights into computation and mathematics

by studying how the brain works. This work draws inspiration from a wide range of disciplines including neuroscience, mathematics, cognitive science, machine learning, digital health, statistics, robotics, computer science and physics.

The hub complements the other research areas comprising Mental Health, Memory, Movement and Sleep.

[Read more about BN's research](#)

Young people and school lockdown

A report published by the National Institute for Health Research in Aug 20 raises questions about the impact of the school environment on young people's mental health and calls for more support to help them when they return to the classroom. More than half (54%) of the 13 to 14-year-old girls surveyed in October 2019 showed they were at risk of anxiety, compared to around a quarter (26%) of boys of the same age. When surveyed again in May 2020, during the pandemic which forced schools to shut and placed unprecedented restrictions on people's lives, the figures dropped by nearly 10% among girls to less than half

(45%) and to less than one in five of boys (18%).

The natural expectation would be to see an increase in anxiety, but data indicated the opposite. Of particular interest, those students who felt least connected to school before the lockdown saw a larger decrease in anxiety which raises questions about how the school environment affects some younger teenagers' mental well-being. Depression



levels remained fairly consistent over time, with a 2% decrease of boys at risk of depression and a 3% increase in girls at risk of depression. This was again unexpected and arguably shows the resilience of young people and their ability to adapt to challenging situations.

Whilst welcome news, it does raise interesting questions about what the key drivers and triggers of anxiety or depression are for this particular age group.

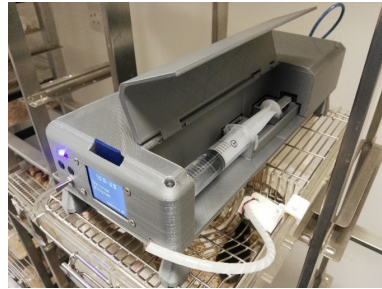
Widnall E, Winstone L, Mars B, Haworth C & Kidger J. [Young people's mental health during the COVID-19 pandemic](#).

Funding successes: Part 1

Jimmy Turnbull (University of Stirling) in collaboration with Jeff Lines and Nathan Pyne-Carter of ACE Aquatec Ltd and [Toby Knowles](#) (Bristol Veterinary School) have been awarded a £721,580 grant from the **Humane Slaughter Association** to improve methods of stunning prior to slaughter in farmed fish. The aim is to measure brain activity of fish around the time of slaughter, allowing the refinement of stunners.

Drs [Paul Dodson](#) and Riccardo Avvisati (Physiology, Pharmacology and Neuroscience {PPN}) were awarded a National Centre for the Replacement, Refinement & Reduction of Animals in Re-

search (**NC3Rs**) skills and knowledge transfer grant to develop and share a device they made to help manage and monitor rodent fluid intake.



Dr [James Hodge](#) (PPN) with co-applicant Prof Katie Lunnon (University of Exeter) has been awarded £250,000 from **Alzheimer's Research UK** for *Functional screening of novel genes associated with Alzheimer's disease to investigate new mechanisms, therapeutic targets and drugs* for 3 years.

Enhanced Animal Behavioural Analytics For Improved Cattle Welfare, Health, Productivity and Sustainability; this £211,593 award is an **Innovate UK** Transforming Food Production Feasibility Study between Quant Foundry and Bristol Veterinary School, supported by the South West Dairy Development Centre with AgriEPI-Centre and Kingshay. The study will use technology developed as part of the Vet School's John Oldacre Centre for Welfare and Sustainability in Dairy Production. Investigators: Prof [Andrew Dowsey](#), Dr [Siobhan Mullan](#), Dr [Suzanne Held](#) and Prof [Mike Mendl](#) (all Bristol Veterinary School).

Shining light on early dementia mimics

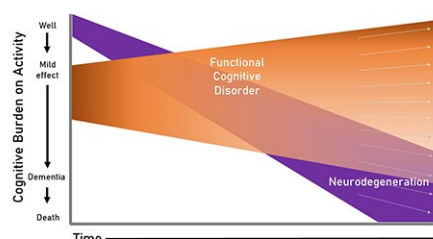
Experts estimate up to one third of people attending specialist memory clinics could have a condition that is commonly mistaken for early dementia. Academics and clinicians collaborated to develop a diagnostic definition of the widely recognised but poorly understood condition, Functional Cognitive Disorder (FCD). Providing diagnostic criteria is an incredibly important step toward improving diagnosis, management and research into FCD and other cognitive disorders.

Dysfunction of day-to-day thinking processes is a feature of FCD but it is often misdiagnosed as early dementia. We estimate up to a third of people attending specialist memory clinics have FCD. While FCD involves impairment of thinking processes, unlike dementia, it is not expected to progress. From a patient's point of view, that is a very different prognosis and one that

requires different management. As clinicians, our aim is to unravel the causes of early memory symptoms, and importantly, identify those that can improve over time rather than deteriorate towards dementia. Having clear diagnostic criteria for FCD will enable us to better characterise the condition and better explain it, and its prognosis, to patients and their families.

Dr [Harriet Ball](#) (Bristol Medical School: Population Health Sciences)

Ball H *et al.* (2020). **Functional cognitive disorder: dementia's blind spot.** *BRAIN*.



Alcohol during pregnancy linked to offspring depression

Children of mothers who drink alcohol during pregnancy may be at an increased risk of developing depression in late adolescence. Researchers investigated whether the frequency mothers and their partners drank alcohol during pregnancy was associated with offspring depression at age 18. Using data from [Bristol's Children of the 90s](#) the team analysed data from a sample of 14,541 pregnant mothers, comprising 4,191 mothers who had consumed alcohol between

18 and 32 weeks of their pregnancy, and diagnoses of depression at age 18 in their children.

The study found that children whose mothers consumed alcohol at 18 weeks pregnant may have up to a 17% higher risk of depression at age 18 compared to those mothers who did not drink alcohol. However, there was little evidence of any association between partner drinking and offspring depression in adolescence. This suggests that the association seen with maternal

drinking may be causal, rather than due to confounding by other factors (which might be expected to be similar between mothers and their partners).

Easey K *et al.* (2020). [Association of prenatal alcohol exposure and offspring depression: A negative control analysis of maternal and partner consumption](#). *Alcoholism: Clinical and Experimental Research*.

Funding successes: Part 2

Prof [Stan Zammit](#) (Bristol Medical School: Population Health Sciences) received £300,000 from the **Wellcome Trust** for *Understanding the mechanisms linking cities to psychotic experiences across the lifespan*, from Feb 20 for four years.

The **Above & Beyond** charity awarded £98,205 to Dr [Georgia Russell](#) (Bristol Medical School: Translational Health Sciences) for *Neuro-endo-immunomodulation in glucocorticoid based therapeutics*, Feb 20 for 18 months; and also £20,586 to Dr [Claire Rice](#) (Bristol Medical School: Translational Health Sciences) for *Feasibility study of*

timed acoustic stimulation of sleep in RRMS, from May 20 for one year.

Dr [Angela Attwood](#) (Psychological Science) received £46,798 from **Public Health England** to study *Effects of e-cigarette flavours on cigarette cue-induced craving*, starting Feb 20 for 11 months.

The **Biotechnology and Biological Sciences Research Council** (BBSRC) awarded £148,152 to Dr [Luca Giuggioli](#) (Biological Sciences/Engineering Mathematics) for *Quantifying interaction in moving animals*, from Jun 2020 for 18 months.

Dr [Martin How](#) (Biological Sciences) was recognised by The

Rank Prize Funds for excellence in research with a £3,500 award for *Spectral sensitivity of mantis shrimp vision*. He also received £9,985 from the **Association for the Study of Animal Behaviour** for the project *Polarization vision in fish- can mudskippers see the polarization of light?*

The **Engineering and Physical Sciences Research Council** awarded Prof [Weiru Liu](#) (Engineering Mathematics, pictured) for *CHAI: Cyber Hygiene in AI enabled domestic life*, £393,061 starting December 2020 for three years.



Germ Defence to reduce worldwide COVID-19 spread

'Germ Defence' is the only digital behavioural infection control intervention worldwide. Proven to reduce the transmission of infections in the home, clinicians and researchers from the Universities of Southampton, Bristol, Bath and Public Health England have developed the resource into a freely available worldwide app in 20 languages. Supported by funding from UK Research & Innovation, [Germ Defence](#) will supplement public health advice

by employing behaviour change techniques which can only be provided by an interactive app. The resource helps users with pre-planning for how to isolate an infected household member as far as possible; personalised goal setting for increasing a range of infection control behaviours; changing the home environment to support new habits; and problem solving to overcome barriers.



Research into its effectiveness involving a study of over 20,000 people found that users of the site were less likely to catch flu or other viruses; and if they did become ill, on average, their illnesses were shorter and milder. [The study](#), published in the *BMJ*, argued that since most people with COVID-19 are cared for at home, it is increasingly important to limit the amount of virus they come into contact with by reducing virus load.

External engagements: Part 1

PhD student [Veronika Hadjipanayi](#) (Psychological Science) was awarded a **President's Poster Commendation Prize** at the Experimental Psychology Society's online meeting held on 30 June 2020. Veronika was one of two students who was awarded the prize for her poster titled *Eye movements during unequal attention splitting in a multiple object tracking task*.

Jo Edgar (Bristol Veterinary School) featured on BBC Countryfile on 12 April 2020 talking about social behaviour and intelligence in chickens. Watch the episode [here](#). Also talking about chicken welfare was Dr Siobhan Mullan (Bristol

Veterinary School) on [BBC's Farming Today](#), aired on 22 September 2020, where she discussed the advantages of slow versus fast growing breeds. Her segment starts at 9mins30sec.

Bringing together multi-person virtual reality technology, dance practice and visual impairment, Prof [Ute Leonards](#) (Psychological Science), who leads [Urban Vision Science](#), has been working closely with artist and researcher [Lisa May Thomas](#),

artistic director for [Soma](#), and visually impaired dancer [Holly Thomas](#). Soma is a participatory performance which combines multi-person Virtual Reality (VR) technology with movement-based practices.

A recent documentary sees Holly reporting on how her experience of Soma allows her to perceive depth in the visual virtual environment, something she does not experience in her usual, everyday perceiving of the physical world.



Image: Paul Blakemore from the Figuring prototype performance (2018, see project archive), with participant Holly Thomas and project dancer Anne-Gaelle Thiriot.

[Watch the documentary](#)

Synthetic corticosteroids and the adrenal gland

Synthetic corticosteroid drugs are widely prescribed to treat many inflammatory and autoimmune diseases, but taking a high dose over a long period of time can cause adverse side effects. Patients undergoing prolonged corticosteroid treatment can also develop adrenal insufficiency, which in rare occasions can lead to adrenal gland failure. In the study the team tested the hypothesis that synthetic corticosteroids cause long-term changes in the adrenal gland steroidogenic

pathways that are responsible for adrenal suppression. They found that the rhythms of glucocorticoid secretions are disrupted following prolonged treatment with synthetic corticosteroid drugs, and that the adrenal steroidogenic pathway is directly affected. These changes persist long after discontinuation of the treatment. The study also showed a pro-inflammatory effect of synthetic glucocorticoids treatment in the adrenal gland. Intra-adrenal activation of the immune system can

affect adrenal functionality by interfering with the steroidogenic pathway, damaging adrenal endothelial microvascular cells, and by inducing apoptosis and reducing cell viability.

Spiga F *et al.* (2020). [Prolonged treatment with the synthetic glucocorticoid methylprednisolone affects adrenal steroidogenic function and response to inflammatory stress in the rat.](#) *Brain, Behavior, and Immunity.*

Sleep, lockdown and their effects on older people

Disrupted sleep can increase the risk of dementia and anecdotal evidence suggests COVID-19 anxiety is having a detrimental effect on sleep. A new study led will focus on how the current lockdown is affecting sleep in older people with and without dementia. It is hoped the findings will increase our understanding of how sleep can influence brain health and long-term dementia risk. The questionnaire-led study, called SleepQuest, aims to understand sleep quality, mental health and circadian rhythms in older people. Up to 5,000 participants will be recruited through [Join Dementia Research](#), social media and older people's net-

works. The current COVID-19 crisis has led to a large number of people experiencing disrupted sleep and circadian rhythms, which could result in the development of chronic sleep problems. Some will successfully employ strategies to improve their sleep and wellbeing. However, in the longer-term, poor sleep may hasten dementia onset or progression, a risk that is likely to be highest in people of late working age and older.

The study aims to:

- Learn how sleep and circadian rhythms are disrupted during the COVID-19 crisis;
- Rapidly make available online advice on the best

sleep and circadian rhythms during times of stress based on existing resources and the findings from SleepQuest;

- Monitor the long-term impact of sleep and circadian patterns during and after lockdown (through longer term follow up).

The initial survey is now closed, with a second questionnaire expected to go out in six months' time.



Funding successes: Part 3

The **Defence Science and Technology Laboratory** awarded Dr [Andrew Conn](#) (Civil, Aerospace and Mechanical Engineering) £95,976 for a *Bio-inspired and Soft Robotics Study* starting Aug 20 for 9 months.

Supporting people bereaved during COVID-19: a mixed methods study of bereaved people's experiences and the bereavement services supporting them has been supported by a £122,665 award to Dr [Lucy Selman](#) (Bristol Medical School: Population Health Sciences) from the **Economic and Social Research Council**, starting Aug 20 for 18 months.

Prof [Rona Campbell](#) (Bristol Medical School: Population Health Sciences) received £2,922 from the **National Institute for Health Research** for *Cyberbullying and Mental Health: a Cross-Sectional Study of Adolescents in South West England*, starting Aug 20 for 11 months.

The **Arts and Humanities Research Council** awarded Dr [Sean Roberts](#) (Arts) £201,173 for *Causal approaches to investigating language evolution* starting Jun 20 for two years.

Prof [Jeremy Henley](#) (Biochemistry) received £1,060,593 for a **Wellcome Trust** Investigator award entitled *Molecular mechanisms*

determining the polarised synaptic distribution and molecular function of the retro-grade endocannabinoid signalling system.

Dr [Paul Anastasiades](#) (Bristol Medical School: Translational Health Sciences) was awarded a NARSAD Young Investigator award from the **Brain and Behavior Research Foundation** to study prefrontal cortex development in Autism. Earlier this year he received a Fellowship as part of the Marie Skłodowska-Curie Actions scheme from the **European Commission** which will allow him to work with Dr Mike Ashby (PPN) and will focus on adolescent prefrontal cortex development in healthy ageing.

Eavesdropping crickets drop from the sky to evade

Research has uncovered the highly efficient strategy used by a group of crickets to distinguish the calls of predatory bats from the incessant noises of the nocturnal jungle. Sword-tailed crickets of Barro Colorado Island, Panama, are unlike many of their nocturnal, flying-insect neighbours. Instead of employing a variety of responses to bat calls of varying amplitudes, these



crickets simply stop in mid-air, effectively dive-bombing out of harm's way. The higher the bat call amplitude, the longer they cease flight and further they fall. Within the plethora of jungle sounds, it is important to distinguish possible threats. Bush-cricket calls are acoustically similar to bat calls and form 98% of high-frequency background noise in a nocturnal rainforest; as a result, the crickets have evolved to re-

spond only to ultrasonic calls above a high-amplitude threshold, and only sufficiently loud ones which indicate the bat is within 7 metres—the exact distance at which a bat can echo-locate the insect.

Romer H & Holderied M (2020). [Decision making in the face of a deadly predator: high amplitude behavioural thresholds can be adaptive for rainforest crickets under high background noise levels.](#) *Philosophical Transactions of the Royal Society B.*

New mental health projects

The Elizabeth Blackwell Institute has funded projects looking into different aspects of mental health with support from the Rosetrees Trust and Wellcome Trust Institutional Strategic Support Fund (ISSF). The successful projects demonstrated clear pathways to deliverables and next steps, such as impact on practice, patient or individual outcomes or future large-scale programmes of work.

Successful awardees

- Dr [Jennifer Cooper](#) (Bristol Medical School): *Forecasting the effects of COVID-19 on patient experience and service delivery across a whole mental health system: a computer simulation study*. Co-applicants: Rachel Denholm, John Macleod, Ben Murch, Julian Walker, Richard Wood (NHS).
- Prof [Bruce Hood](#) (Psychological Science): *Evaluation of an Online Science of Happiness Course on student mental wellbeing*. Co-applicant: Sarah Jelbert.
- Dr [Michelle Farr](#) (Bristol, Medical School): *Mobile technology for survivors of modern slavery and human trafficking: Impacts on mental health and wellbeing*. Co-applicants: Alice Malpass, Jeremy Horwood, Hugh McLeod.
- [Alex Kwong](#) (Bristol Medical School): *The long-term impact of COVID-19 on mental health: comparisons between health record linkage and observed longitudinal data*. Co-applicants: Rebecca Pearson, Andy Boyd, Dheeraj Rai, Ryan McConville, Julian Walker (NHS).
- Dr [Felicity Sedgewick](#) (Education): *The impact of COVID-19 and distance learning on undergraduate students' resilience and psychosocial wellbeing: A three-stage study to explore, implement, and evaluate effective strategies to build student community*. Co-applicants - Antonia Lythgoe, Charlotte Flothmann, Trang Mai Tran.

Loneliness makes it harder to quit smoking

Although numerous studies have shown there is an association, it has been difficult to disentangle whether being lonely leads to substance abuse, or if substance abuse leads to loneliness. By applying Mendelian randomisation, which uses genetic and survey data from hundreds of thousands of people, a team found that loneliness appears to lead to an increased likelihood of smoking behaviour. There was evidence that being lonelier increases the likelihood of starting smoking, the number of cigarettes smoked per day and decreases the likeli-

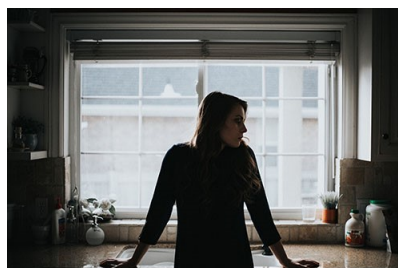
hood of successfully quitting. This reflects the trends observed during the pandemic - YouGov's Covid-19 tracker suggests 2.2 million people across the UK are smoking more than they were before lockdown. In the other direction, there was also evidence that starting smoking increased individuals' loneliness.

The team also investigated the relationship between loneli-

ness and alcohol use and abuse, and found no clear evidence for a causal relationship there.

The study was co-led by [the Tobacco and Alcohol Research Group \(TARG\)](#) and the department of Psychiatry of Amsterdam UMC hospital in the Netherlands, part of the Medical Research Council funded Integrative Epidemiology Unit.

Wootton RE *et al.* (2020). [Bi-directional effects between loneliness, smoking and alcohol use: Evidence from a Mendelian randomisation study](#). *Addiction*.



Evolution of colour vision in sea snakes

A study has revealed the evolution of colour vision in elapid snakes following their transition from terrestrial to fully marine environments, and provided evidence of where, when and how frequently the species have adapted their ability to see in colour. The research suggests sea snakes' vision has been modifying genetically over millions of generations, enabling them to adapt to new environments and meaning they can continue to see prey – and predators – deep below the sea sur-

face. All snakes are descended from highly visual lizards, but advanced colour vision was lost in the early ancestors of snakes, probably because they inhabited dim-light environments. The team used sequencing of vision genes and spectrophotometry to reveal that sea snakes have undergone rapid changes in their visual pigments compared to their relatives on land. Gene losses during evolution have left living snakes with only two types of cone opsin, which are the pigments responsible for detecting bright light. In most

terrestrial snakes, the short wavelength sensitive cone opsin has peak sensitivity to ultraviolet light. But in sea snakes this pigment has undergone repeated shifts into the visible spectrum, which would be beneficial for vision underwater, where longer wavelengths dominate.

Simões B *et al.* (2020). [Spectral Diversification and Trans-Species Allelic Polymorphism during the Land-to-Sea Transition in Snakes](#). *Current Biology*.

Funding successes: Part 4

Dr [Sabine Hauert](#) (Engineering Mathematics) was awarded £30,000 from **Nesta** to pursue a project entitled Social Swarms for Social Gatherings, starting Mar 20 for 11 months.

Dr [Chris McWilliams](#) (Engineering Mathematics) received £535,000 from the **National Institute for Health Research** AI in Health and Care award with University Hospitals Bristol NHS Foundation Trust. The project, *SMARTT Critical Care Pathways (Safe, Machine Assisted, Real Time Transfer): An Artificial Intelligence based Decision Support Tool to Enable Safer and More Timely Critical Care Transfer*, follows directly from an Im-

pact Acceleration Account funded secondment.

Dark-dwellers as more-than-human misfits: a new synthesis of disability studies, environmental history and histories of human-animal relations has been supported by a £199,642 award from the **Arts & Humanities Research Council**. The fellowship will allow Dr [Andrew Flack](#) (History) to complete the project starting Feb 21 for 18 months.

The **Alan Turing Institute** awarded Mr [Umberto Benedetto](#) (Bristol Medical School: Translational Health Sciences) £104,121 for *Machine Learning for Risk Prediction in Adult Cardiac Surgery in the United Kingdom*, starting Apr 20 for 18

months.

Mrs [Rosie Cornish](#) (Bristol Medical School: Population Health Sciences) will be researching *The impact of childhood adversity on violent crime in adolescence and early adulthood* thanks to a £218,814 award from the **Economic and Social Research Council**, starting Dec 20 for two years.

A **Worldwide Universities Network** award of £9,723 has gone to Prof [Richard Watermeyer](#) (Education) for Mental health and wellbeing of academics and international students in a COVID19 context, starting Apr 20 for four months.

How touchscreens affect pre-schoolers' play

Dr [Elena Hoicka](#) (Psychological Science) will be leading a new research project looking at how touchscreens affect the way two and three year olds play and what impact this has on children's development. Due to the pressures associated with COVID-19, parents and care-givers around the world have increasingly relied on touch-screens to help them balance looking after a toddler with other demands such as

working from home and home-schooling. Some may have questions or concerns about the impact this could have on their children. The research will determine whether touchscreens are good for children's development, bad, or a bit of both.



Funded by the [British Academy](#), parents and care-givers from all over the world are invited to participate by booking an appointment at babylovesscience.com. The study involves participants playing with a touchscreen app or toys with their child while speaking to a researcher on Skype. The session will last around one hour. Participants will receive a £10 Amazon voucher as a thank you.

External engagements: Part 2

Dr [Denize Atan](#) (Consultant Senior Lecturer in Neuro-ophthalmology, Bristol Eye Hospital), contributed to an interview series run by Dr [Shelley James](#), to raise awareness of the impact of our indoor lives on the health and well-being of children, including their visual health. The interview, along with a series of 14 other videos, have brought together experts from education, cognitive neuroscience, ophthalmology, design and leading lighting manufacturers.

[Watch the interview.](#)

Prof [Colin Davis](#) (Chair in Cognitive Psychology) & Dr [Oscar Berglund](#) (Lecturer in

International Public and Social Policy) took part in a video produced by the Cabot Institute in which Oscar discusses the philosophy and Colin speaks about the psychology of civil disobedience. The full video [can be found here](#). More information on this research can be found on [the Cabot Institute's website](#).



Produced by the [Elizabeth Blackwell Institute](#) a video, launched on World Mental Health Day (10 October 2020), sees Dr [Myles-Jay Linton](#), Elizabeth Blackwell Institute Vice-Chancellor's Fellow in Young

People's Mental Health, talk to Ruth Day, Student Living Officer for the University of



Bristol's Student Union, and Olivier Levy, Chair of the Wellbeing Network for the Student Union, for World Mental Health Day 2020.

[Watch the video](#)

Prof [Matt Jones](#) (PPN) gave a one hour lecture for University of Bristol alumni on 8 September 2020 looking at *The Science of Sleep*.

[Watch the video](#)

Funding successes: Part 5

Bristol Health Partners (BHP) is one of eight designated [Academic Health Science Centres](#) (AHSCs) in England. The AHSC, supported by the **National Institute for Health Research**, will drive service change, leading to world-class health, clinical and economic outcomes for the regional population across Bristol, North Somerset and South Gloucestershire (BNSSG). Over the next five years, BHP will be focusing on six key areas including public health and prevention; mental health and neuroscience; cardiovascular science; surgical innovation; perinatal, reproductive and

children's health and delivering integrated, optimal and equitable care across BNSSG.

An **Engineering and Physical Sciences Research Council** (EPSRC) Transformative Healthcare Technologies 2050 grant was awarded for *em-POWER: in-body artificial muscles for physical augmentation, function restoration, patient empowerment and future healthcare*. Worth £8M for period of 5 years, the project is a collaboration with Prof [Jonathan Rossiter](#) (Bristol Robotics Laboratory), Imperial College, UCL, and the Bristol Royal Infirmary.

An **EPSRC** Impact Acceleration Account Exploratory Award to monitor temperature profiles of racehorse foals (£14,769) has gone to Drs [Laszlo Talas](#), [John Fennell](#) (Bristol Veterinary School) and Sarah Smith (Langford Clinical Veterinary Service) to install sensory platforms equipped with small thermal cameras to monitor foals for early disease detection. Foals are susceptible to respiratory infections resulting in fever which can be detected by thermal cameras. Early detection can help reduce antimicrobials use, mitigate risk of infecting other horses and increase animal welfare.

Zebra stripes and their role in dazzling flies

Over the last decade Prof [Tim Caro](#) (Biological Sciences) has examined and discredited many popular theories of why zebras have their characteristic stripes, such as their use as camouflage from predators, a cooling mechanism through the formation of convection currents and a role in social interactions. Stripes acting to confuse predators is another common explanation, but it too is flawed when looking at the scientific data. Instead, mounting evidence suggests that it is parasitic flies that are confounded by the zebra's distinctive

patterning. Previously researchers had shown that blood-sucking horseflies would approach horses in striped rugs as often as plain rugs, but then failed to land or slow down when they got close. Essentially, stripes dazzled the flies, forcing them to collide with the skin or fly away altogether. In their new study they explored a potential mechanism explaining how the

stripes lead to this outcome: the aperture effect.

Despite its appeal to visual ecologists, this research found that the aperture effect is not the mechanism behind fly confusion through comparing fly landings on horses wearing striped versus checked rugs; stripes themselves are not unique to deterring tabanid horseflies, other patterns can be effective too.

How M *et al.* (2020). [Zebra stripes, tabanid biting flies and the aperture effect](#). *Proceedings of the Royal Society B*.

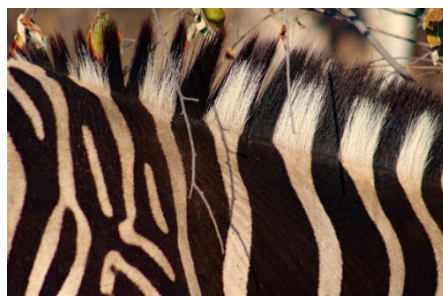


Image © Amelia Gillard, UoB

Robot jaws: could medicated chewing gum be the future?

Medicated chewing gum has been recognised as a new advanced drug delivery method but currently there is no gold standard for testing drug release from chewing gum *in vitro*. Research has shown a chewing robot with built-in humanoid jaws could provide opportunities for pharmaceutical companies to develop medicated chewing gum. The aim of the study was to confirm whether a humanoid chewing robot could assess medicated

chewing gum; the robot closely replicates the human chewing motion in a closed environment, features artificial saliva and allows the release of xylitol in the gum to be measured. The study wanted to compare the amount of xylitol remaining in the gum between the chewing robot and human participants. They found the chewing robot



demonstrated a similar release rate of xylitol as human participants, with the greatest release

of xylitol occurring during the first five minutes. The findings give pharmaceutical companies the opportunity to investigate medicated chewing gum, with reduced patient exposure and lower costs using this new method.

Alemzadeh K *et al.* (2020). [Development of a chewing robot with built-in humanoid jaws to simulate mastication to quantify robotic agents release from chewing gums compared to human participants.](#) *IEEE Transactions on Biomedical Engineering*.

How human genes relate to gut bacteria

The role genetics and gut bacteria play in human health has long been a fruitful source of scientific enquiry, but new research marks a significant step forward in unravelling this complex relationship. Its findings could transform our understanding and treatment of all manner of common diseases, including obesity, irritable bowel syndrome, and Alzheimer's disease. The international [study](#) found specific changes in DNA affected both the existence and amount of particular bacteria in the gut.

The study, the biggest of its kind, identified 13 DNA changes related to

changes in the presence or quantity of gut bacteria. Researchers at Bristol worked with Katholieke Universiteit Leuven and Christian-Albrecht University of Kiel to analyse data from 3,890 individuals from three different population studies: one in Belgium (the Flemish Gut Flora Project) and two in Germany (Food Chain Plus and PopGen). In each individual, the researchers measured millions of

known DNA changes and, by sampling their faeces, also registered the presence and abundance of hundreds of gut bacteria. Such investigations could hold the key to unlocking the intricate biological mechanisms behind some of the biggest health challenges of our time.

Hughes DA *et al.* (2020). [Genome-wide associations of human gut microbiome variation and implications for causal inference analyses.](#) *Nature Microbiology*.



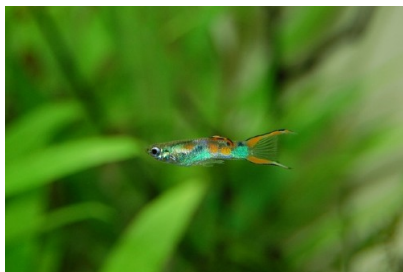
Image credit: A bacterial culture taken from faecal sample © Chloe Russell, as featured in her book Up Your A-Z An Encyclopaedia On Gut Bacteria.

‘Matador’ guppies trick predators

Trinidadian guppies behave like matadors, focusing a predator’s point of attack before dodging away at the last moment. The tiny fish (10-40mm) draw attention by turning their irises black, which makes their eyes very conspicuous. This encourages pike cichlids, the guppies’ main predator, to charge at their head rather than their body. The international study, led by the University of Exeter, found guppies then use their lightning reflexes to whip their head out of the way, causing the predators to miss, before swimming away.

Many fish, including guppies, often approach their predators to find out if they are hungry and thus a current threat.

Eyes are one of the most easily recognised structures in the natural world and many species go to great lengths to conceal and camouflage their eyes to avoid unwanted attention from predators. Some species, however, have no-



ticeable or prominent eyes; the study gives new insight into why ‘conspicuous’ and colourful eyes have evolved. The team also found that bigger guppies with black eyes are better at diverting and escaping predator attacks. Since bigger animals produce more or larger offspring, it would be interesting to see if animals using these kinds of strategies have evolved to become larger.

Heathcote RJP *et al.* (2020). [A matador-like predator diversion strategy driven by conspicuous colouration in guppies](#). *Current Biology*.

Funding successes: Part 6

Dr [Paul Dodson](#) (Physiology, Pharmacology and Neuroscience) was awarded £538,547 from the **Biotechnology and Biological Sciences Research Council** (BBSRC) for The Role of cerebellum in dopamine neuron reward prediction error coding, starting Dec 20 for three years.

The **Elizabeth Blackwell Institute** awarded Dr [Aisling O’Kane](#) (Computer Science) £3,912 for Amazon Echo Show for health, care and wellbeing needs for residents and carers during self-isolation. Over 60 [COVID-19 projects](#) were supported by EBI between April and July.

Prof [Hans Reul](#) (Bristol Medical School: Translational Health Sciences) received £582,296 from the **BBSRC** to pursue *Epigenetic regulation of stress-induced glucocorticoid action in the dentate gyrus and its behavioural implications*, starting Jun 20 for three years.

Professor of Cyber Security [Awais Rashid](#) (Engineering) is Director of the new Research Centre on Privacy, Harm Reduction and Adversarial Influence Online, created thanks to a £8.6M grant from **UK Research & Innovation**. The team involved includes experts from the Universities of Bristol, Bath, Edinburgh, King’s College

London and UCL, across a wide range of fields including Computer Science, Law, Psychology and Criminology. [RE-PHRAIN - Research Centre on Privacy, Harm Reduction and Adversarial Influence Online](#) - will consolidate the UK’s academic, industry, policy and third sector capabilities and will provide a single body to engage with government, industry and citizens. The Centre will develop innovative and holistic regulatory and policy approaches to reduce online harms and provide policymakers, regulators and industry with evidence-based guidelines to tackle harmful digital activities. [Read more](#)

Improving diagnosis and treatment of Huntington's

A research project describes how SAFB1 expression occurs in both spinocerebellar ataxias and Huntington's disease and may be a common marker of these conditions, which have a similar genetic background. SAFB1 is an important protein controlling gene regulation in the brain and is similar in structure to other proteins associated with neurodegenerative diseases of age. The team wanted to find out if this protein might be associated with certain neurodegenerative condi-

tions. They analysed SAFB1 expression in the post-mortem brain tissue of spinocerebellar ataxias (SCA's), Huntington's disease (HD), Multiple sclerosis (MS), Parkinson's disease patients and controls, and found that SAFB1 becomes abnormally expressed in the nerve cells of brain regions associated with SCA and HD. Both of these conditions are associated with a specific pathology, called a polyglutamine expansion (an amino acid repeat), which only occurs in SCAs and HD. The same pa-

thology was therefore not seen in control Parkinson's disease or multiple sclerosis. The findings highlight a previously unknown mechanism causing disease which, importantly, suggests SAFB1 may be a diagnostic marker for polyglutamine expansion diseases.

Buckner N *et al.* (2020). [Abnormal expression of the scaffold attachment factor 1 in spinocerebellar ataxias and Huntington's chorea.](#) *Brain Pathology*.

Image shows SAFB1 protein (yellow) expressed in the Purkinje cells

Do rats like to be tickled?

Rats emit high frequency vocalisations which, when produced during human-simulated play or 'tickling', are thought to be similar to human laughter. Human laughter is complex and when a person is tickled, they may laugh even if they do not find the experience pleasurable. In rats, it has been impossible to know how much any individual rat 'likes' the experience because of limitations in method to directly measure their emotional response. In order to ask the question 'Do rats like to be tickled?' a research team used a behavioural test developed at Bristol which provides a sensitive measure of an ani-

mal's individual emotional experience and they compared the data from this test with the animals vocalisations during 'tickling'. They found not all rats like to be tickled and that some rats emitted very high numbers of calls whilst others did not, and these calls are directly related with their emotional experience. Rats which emitted the most calls had the highest positive emotional response to tickling but those who did not emit any or few

calls did not show a positive response. Being able to measure a positive emotional response in animals is an important way to improve their welfare. Vocalisations made by rats in response to tickling are an accurate reflection of their emotional experience and something which is easy to measure; should this be the case for other situations, measuring vocalisations could provide the simple, graded measure of emotional experience needed to better understand and improve the welfare of rats in a laboratory.



Hinchcliffe J *et al.* (2020). [Rat 50kHz calls reflect graded affective responses.](#) *Current Biology*.

The battle for cognitive evolution

From ants to primates, 'Napoleonic' intelligence has evolved to help animals contend with the myriad cognitive challenges arising from interactions with rival outsiders. Antagonistic and cooperative social interactions within groups have long been suggested to drive the evolution of big brains. But animals from across the social spectrum must constantly juggle threats and opportunities from outsiders too.

Interactions with outsiders have been little considered in the context of cognitive evolution. Draw-

ing on their varied backgrounds in animal cognition, intergroup conflict and social evolution, the Bristol scientists have expanded the Social Intelligence Hypothesis to include this missing social axis. Outside threats and opportunities likely present a range of cognitive challenges. Animals have to defend their territo-



ries, find mates and compete for resources – the researchers believe negotiating such challenges requires considerable brain power, but this aspect of sociality has traditionally been ignored in explanations of animal brain evolution. The authors argue that animals also need 'Napoleonic' intelligence, the sharpness necessary to triumph in a world packed with rival outsiders.

Ashton BJ, Kennedy R & Radford AN (2020). [Interactions with conspecific outsiders as drivers of cognitive evolution](#). *Nature Communications*.

Prizes and awards: Part 1

Prof [Lucy Yardley](#) (Psychological Science) was awarded an **OBE in the Queen's Birthday Honours** 2020 for her services to the COVID-19 response. An internationally renowned health psychologist, she sits on the Scientific Advisory Group for Emergencies (SAGE) – the group tasked with providing scientific advice to aid government decision makers during the coronavirus pandemic. As co-chair of SPI-B, the sub-group that provide behavioural input to SAGE, Prof Yardley has provided evidence-based advice and expertise throughout the pandemic, particularly in relation to

supporting people to implement measures designed to reduce the impact of the virus.

A paper by [Veronica Roberts](#) (Bristol Veterinary School), first published online on 23 September 2019, has been given an award for being in the top 10% of downloaded papers last year from *Equine Veterinary Journal*. Much of the work was done in the equine hospital on clinical cases. Roberts VLH et al. (2019). [The safety and efficacy of neuromodulation using percutaneous electrical nerve stimulation for the management of trigeminal-mediated headshaking in 168 horses](#).

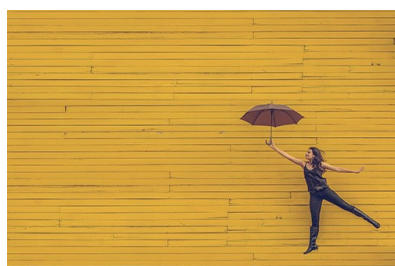
A student Artificial Intelligence

start-up which turns sketches into 3D models has scooped a £10,000 prize and a 12-month membership to tech incubator SETsquared Bristol. [Kaedim](#), whose prototype software is currently being tested by Aardman Animations, won the funding after being crowned the winner of the University of Bristol's New Enterprise Competition. The company was founded in 2019 by University of Bristol undergraduates Konstantina Psoma and Roman Bromidge, who developed the idea during their Computer Science with Innovation Masters. A total of ten finalists were identified, [watch their pitches here](#). [Read more](#)

‘Science of Happiness’ course re-packaged as a BBC

A new BBC podcast will bring the University of Bristol’s ground-breaking Science of Happiness course to a much wider audience.

Using the latest peer-reviewed studies in psychology and neuroscience, [The Happiness Half Hour](#) gives listeners an evidence-based



path to happiness with over 10 weekly episodes. The Science of Happiness is the first university course of its kind in the UK, [launched in 2018](#) by Prof and Developmental Psychologist [Bruce Hood](#) (Psychological Science). It has been a proven success, with hundreds of students taking the course and reporting a significant increase in their wellbeing and a decrease in feelings of loneliness. Prof Hood started the course due to increasing concerns about the rise in mental health



problems among students.

Together with BBC radio presenter [Emma Britton](#), Prof-Hood will bring the best of the course to BBC Sounds, with the first episode aired on 29 September 2020. [Listen to the podcasts on the BBC website.](#)

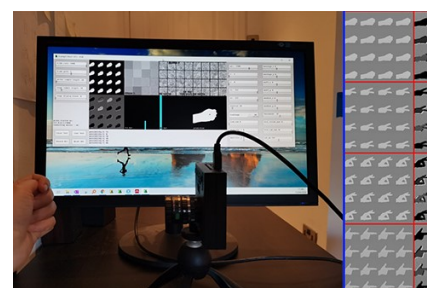
Cameras that can learn

Roboticians and artificial intelligence (AI) researchers know there is a problem in how current systems sense and process the world. Currently they are still combining sensors, like digital cameras that are designed for recording images, with computing devices like graphics processing units (GPUs) designed to accelerate graphics for video games. This means AI systems perceive the world only after recording and transmitting visual infor-

mation between sensors and processors. But many things that can be seen are often irrelevant for the task at hand, such as the detail of leaves on roadside trees as an autonomous car passes by. However, at the moment all this information is captured by sensors in meticulous detail and sent clogging the system with irrelevant data, consuming power and taking processing time. A different approach is necessary to enable efficient vision for intelligent machines.



Implementing Convolutional Neural Networks (CNNs), a form of AI algorithm for enabling visual understanding, directly on the image plane



could help achieve this. The CNNs the team has developed can classify frames at thousands of times per second, without ever having to record these images or send them down the processing pipeline.

YouTube videos explaining the research and two papers that have arisen as a result of the work of the Bristol-Manchester collaboration are [available to view](#).

Brain haemorrhage treatment reduces long-term disability

A technique called 'Drainage, Irrigation and Fibrinolytic Therapy' (DRIFT) is the first and only treatment to objectively benefit infants with serious brain haemorrhage which can lead to severe learning impairment and cerebral palsy. Pioneered in 1998 and trialled from 2003 by Andrew Whitelaw, Professor of Neonatal Medicine at the University of Bristol and Ian People, Consultant Neurosurgeon from University Hospitals Bristol and Weston NHS Foundation Trust, the therapy aimed to reduce disability in premature babies

with serious brain haemorrhage by washing out the ventricles in the brain to remove toxic fluid and reduce pressure. In this NIHR-funded (DRIFT10) ten-year follow-up study, researchers assessed 52 of the 65 survivors from the original cohort of 77 premature babies with severe brain haemorrhage who had been recruited for the randomised controlled trial. Of these, 39 babies received the DRIFT intervention, and 38 received standard treatment which uses lumbar punctures to control expansion of the ventricles and reduce pressure. Using results from cognitive, vision, move-

ment and behaviour assessments, parent /guardian interviews, and educational attainment scores, the team found that the pre-term babies who received DRIFT were almost twice as likely to survive without severe cognitive disability than those who had received standard treatment.

Luyt K *et al.* (2020). [Drainage, irrigation and fibrinolytic therapy for post-haemorrhagic ventricular dilatation: 10-year follow-up of a randomised controlled trial](#). *Archives of Disease in Childhood*.

Successful awards: Part 7

The **Jean Golding Institute** awarded seed corn funding to six postgraduate researchers in their 2020 round. Among the successful applicants were:

- **Hugo Alcaraz Herrera** (Engineering) is studying for a PhD in Evolutionary Computing and Machine Learning. His research fields are Evolutionary Computing (mainly Genetic Algorithms and Genetic Programming) and Machine Learning (supervised learning). He has applied these techniques to solve problems related to logistic processes. Hugo's project is called *Evolutionary Systems for personalised*

wellbeing recommendations, a food and physical activity data-driven user study.

- **Katie Winkle** (Engineering) is studying for a PhD in Robotics and Autonomous Systems. Her project is called *Real-time, On-Board Robot Assessment of In-the-Wild Child Social Dynamics for Supporting Education*; its aim is to develop a system that can automatically, in real time, identify the social engagement, and/or social attitudes of children that are interacting with each other in a classroom context based on an audio/video feed.

- **Lenka Hasova** (Geographical Sciences) is studying for a PhD in Advanced Quantitative

Methods. Her project, *Modelling Mobility Trajectories: Exploring Individuals spatial behaviour and assessing the trend of the Bristol population spatial interaction*, focuses on analysing individuals movement trails in Bristol, which can be retrieved from the individuals locational traces captured by their mobile devices. By investigating the movement trajectories, each stop and preferred destinations we can better understand individuals spatial preferences and spatial behaviour. This knowledge will be then used in building more comprehensive models of human spatial interaction and its prediction.

Dolphins learn foraging skills from peers

For the first time it has been demonstrated that dolphins can learn foraging techniques outside the mother-calf bond, showing that they have a similar cultural nature to great apes. A team has been studying the dolphins of [Shark Bay](#), Western Australia, for almost 40 years and were able to document the first instances of foraging technique called *shelling*, a tactic used by dolphins to target



prey that hide inside large empty shells of giant sea snails in Shark Bay. The team, led by the University of Zurich, conducted surveys between 2007 and 2018 to quantify how shelling behaviour spread across the population. From over 5,000 dolphin group encounters they identified more than 1,000 different individuals. A total of 42

shelling events were documented, performed by 19 individual dol-

phins. Foraging techniques were typically passed on from dolphin mothers to their offspring (vertical social transmission), But the new study demonstrates that some of Shark Bay's dolphins have actually learned this foraging method outside the mother-calf bond, from their peers.

Wild S *et al.* (2020). [Integrating genetic, environmental and social networks to reveal transmission pathways of a dolphin foraging innovation](#). *Current Biology*.

Combatting misinformation

With the current flood of misinformation and "fake news" undermining democracies around the world, a consensus document that summarises the science of debunking has been published by a team of 22 prominent researchers of misinformation and its debunking.

Well-informed political deliberation cannot occur when citizens and politicians are entangled in the dissemination of misinformation. Misinformation has particularly insidious psychological consequences because it often "sticks" in people's memories even after it has been debunked, and even when people believe and acknowledge a correction.

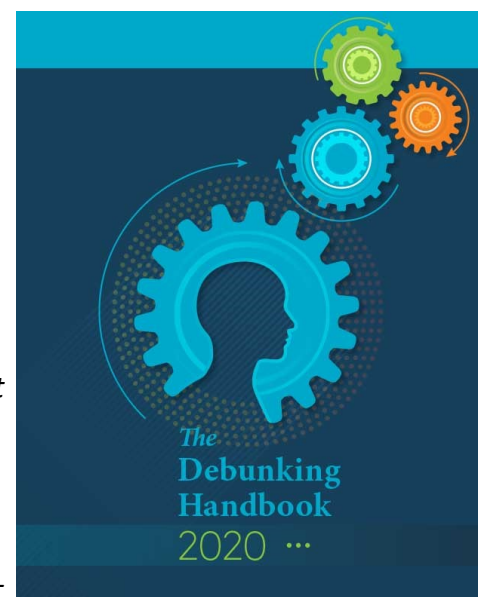
[The Debunking Handbook 2020](#) has been made freely available to the public, policy makers, journalists, and other practitioners and is a consensus document that reflects experts' understanding of the science of debunking.

Social media has created a world in which traditional gate-keepers are largely absent, which allows misinformation to spread farther and faster online than ever before, and it is becoming increasingly difficult for the public to sift information that is accurate from false or misleading information.

This handbook helps explain how best to combat misinformation, namely through

intensive debunking or inoculating people against misleading information before it is encountered.

Prof Stephan Lewandowsky
(Psychological Science)
lead author



COVID bereavement among BAME people

A pioneering study into people's experience of bereavement during the COVID-19 pandemic has been launched by researchers from the universities of Cardiff and Bristol.

Funded by the Economic and Social Research Council, the project will be the first to investigate how bereavement support, during and beyond the pandemic, can meet the needs of those who are currently grieving for loved ones. A key focus of the study is to ensure that equitable bereavement support is provided across

the UK. To do this the researchers aim to recruit as many people as possible who have been bereaved since March this year and are from an ethnic minority background. BAME people are **twice as likely to die as white people** from COVID-19. Many families have not been able to visit dying loved ones, have had to grieve alone during lockdown and have experienced painful disruptions to funerals and traditional death rites. The study aims to understand how issues like



these have complicated the grieving process for people. Having to deal with the complexities of grief in lockdown, as well as the harsh realities of racism, has likely made grief more complex for many of people. Additionally, some BAME people have experienced the devastating loss of multiple bereavements in their families and communities.

To participate in the research and share your experience of grief during the pandemic, please complete the online survey [here](https://www.covidbereavement.com) or visit www.covidbereavement.com.

Successful awards: Part 8

Motion illusions for defence Dr **Christos Ioannou** and Dr **Rob Heathcote** (Biological Sciences), with co-investigators Prof **Innes Cuthill** (Biological Sciences), Prof **Nick Scott-Samuel** (Psychological Science) and Dr **Jolyon Troscianko** (University of Exeter) have won a £425,000 **Biotechnology and Biological Sciences Research Council** grant to investigate "dazzle patterns" in nature. Darwin and Wallace argued about why zebras have high-contrast black and white stripes, and it has been argued that such 'dazzle patterns' can affect predators by creating motion

illusions. Although high-contrast paint designs were used on allied ships during WWI and WWII to deceive enemy U-boats, how dazzle illusions can reduce the risk of attacks in the natural world and their potential applications in industry have hardly been explored. This project will be the first study on the dazzle illusions created by real animals under realistic conditions. The team will study 24 species of fish that vary in coloration, using a combination of visual modelling and behavioural experiments with biomimetic robotic versions of these fish.

An Engineering and Physical Sciences Research Council Im-

pact Acceleration Account Knowledge Transfer Secondment grant to improve high visibility patterns on cycling apparel in collaboration with industry partner Rapha was awarded to Dr **John Fennell** (Bristol Veterinary School), Nicholas Hodge-Clarke (**Rapha**), Dr **Jasmina Stevanov** (Psychological Science) and Dr **Laszlo Talas** (Vet School). The project will develop high visibility patterns for cyclists; they aim to bring together latest advancements in research on warning colouration in nature, visual illusions and graphic design to create safer apparel for cyclists in various environments.

Enhancing the experience of live events

Computer vision experts from the University of Bristol are part of a new consortium, led by BT, driving the technology that will revolutionise the way we consume live events, from sports such as MotoGP and boxing, to dance classes. The 5G Edge-XR project, funded by the Department for Digital, Culture, Media & Sport (DCMS) as part of its [5G Create](#) programme, aims to demonstrate new and exciting ways that live sport and arts can be deliv-

ered remotely using immersive Virtual and Augmented Reality (VR/AR) technology combined with the new 5G network and advanced edge computing. The consortium, led by BT, also includes; [The GRID Factory](#), [Condense Reality](#), [Salsa Sound](#), and [Dance East](#). The project started in September 2020 and will run until March 2022, with a



budget of over £4M, with £1.5M coming from DCMS. The University of Bristol team, based in the [Visual Information Lab \(VI Lab\)](#), will be working primarily with [Condense Reality \(CR\)](#). The Bristol-based SME, whose CTO and CSO are both Bristol graduates, has developed a state-of-the-art volumetric capture system, capable for generating live 3-D models for AR applications. This brings the prospect of viewing live sports and dance classes in 3-D and in your home.

Genomics opens drug development possibilities

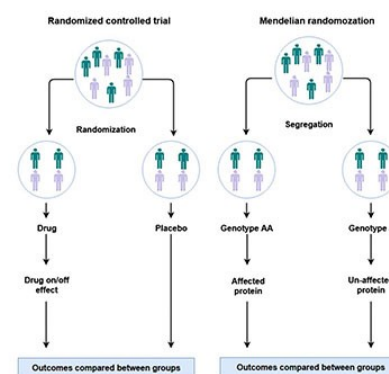
An innovative genetic study of blood protein levels has demonstrated how genetic data can be used to support drug target prioritisation by identifying the causal effects of proteins on diseases. Working in collaboration with pharmaceutical companies, Bristol researchers have developed a comprehensive analysis pipeline using genetic prediction of protein levels to prioritise drug targets, and have quantified the potential of this approach for reducing the failure rate of drug development.

The research aimed to establish if genetic prediction of protein target effects

could predict drug trial success. Using a set of genetic epidemiology approaches, including Mendelian randomization and genetic colocalization, the researchers built a causal network of 1002 plasma proteins on 225 human diseases. In doing so, they identified 111 putatively causal effects of 65 proteins on 52 diseases, covering a wide range of disease areas. The results of this study are accessible via [EpiGraphDB](#). Estimated effects of proteins on human diseases could be used to predict the effects of drugs targeting these proteins. The study lays a solid methodological foundation for future genetic studies of omics. The next step is for the analytical protocol to be

used in early drug target validation pipeline by the study's pharmaceutical collaborators.

Zheng J *et al.* (2020). [Phenome-wide Mendelian randomization mapping the influence of the plasma proteome on complex diseases](#). *Nature Genetics*.



Comparison between randomised controlled trial and Mendelian randomization.

The discrete diffusion equation in finite space

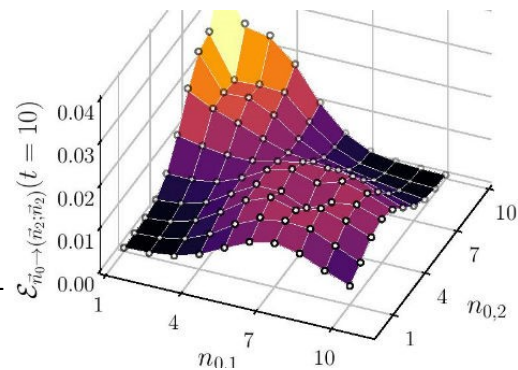
Dr [Luca Giuggioli](#)

(Engineering Mathematics) has achieved a milestone in statistical/mathematical physics by solving this 100-year-old physics problem. His work describes how to analytically calculate the probability of occupation (in discrete time and discrete space) of a diffusing particle or entity in a confined space - something that until now was only possible computationally. The diffusion equation models random movement and is one of the fundamental equations of physics. The analytic solution of the diffusion equation in finite domains, when time and space is continuous, has been known for a long time.

However, to compare model predictions with empirical observations, one needs to study the diffusion equation in finite space. Despite the work of illustrious scientists such as Smoluchowski, Pólya, and other investigators of yore, this has remained an outstanding problem for over a century—until now. Excitingly, the discovery of this exact analytic solution allows us to tackle problems that were almost impossible in the past because of the prohibitive computational costs. The finding has far-reaching implications across a range of disciplines and possible applications include

predicting molecules diffusing inside cells, bacteria roaming in a petri dish, animals foraging within their home ranges, or robots searching in a disaster area.

Giuggioli L (2020). [Exact spatio-temporal dynamics of confined lattice random walks in arbitrary dimensions: A century after Smoluchowski and Polya](#). *Physical Review X*.



How long to play dead in order to stay alive?

Many animals remain motionless or play dead after being attacked by a predator in the hope that it will give up and move onto some other unfortunate prey. A team of scientists from the University of Bristol has been studying this phenomenon in antlions, considered to be one of the fiercest predators in the insect kingdom. Their findings suggest that studying the duration of such immobility may provide a new understanding of predator-prey relationships. The team

discovered that playing dead in antlion larvae is highly strategic – remaining motionless for completely unpredictable periods. Hence, a predator cannot



predict how long its potential prey will remain inactive. This is a strategy that should test to destruction the patience of a

potential predator and has probably saved countless antlions from their fate. The work shows a new way forwards for studies of predator evasion: namely, the importance of quantitative and analytical approaches focusing on how behavioural acts can be strategically timed.

Sendova-Franks AB, Worley A and Franks NR (2020). [Post-Contact immobility and half-lives that save lives](#). *Proceedings of the Royal Society B*.

High-potency cannabis use

Users of high-potency cannabis are four times more likely to report associated problems, and twice as likely to report anxiety disorder, than users of lower-potency strains. Using data from [Children of the 90s](#) (a long-term health study), this is the first research of its kind to look at data from a general population sample, with previous research into the links between cannabis potency and mental health only looking at clinical and self-selecting sam-

ples of people who use drugs. Added to this, the nature of the data available from the Children of the 90s health study enabled the research team to take into account whether mental health symptoms were present before the individual started using cannabis.

Frequency of cannabis use, which is also often associated with increased mental health problems, was also taken into account in order to determine whether this would explain the relationship between

higher-potency usage and mental health conditions. The team concluded that people who use cannabis are more likely to report mental health problems than those who don't use cannabis, but reducing the potency and regularity of their cannabis use may be effective for lessening likelihood of harms from use.

Hines LA *et al.* (2020). [High-potency cannabis, mental health and substance use in adolescence: results from a UK general population sample](#). *JAMA Psychiatry*.

Successful awards: Part 8

Four Bristol researchers have been awarded **UK Research and Innovation** (UKRI) Future Leaders Fellowships. The awards are designed to establish the careers of world-class research and innovation leaders to help them tackle major global challenges. Among the awardees was [Dr Anya Skatova](#) (Bristol Medical School: Population Health Sciences) who will work on realising the value of transaction data to improve population health. Her work will question whether shopping history data (e.g. as recorded through loyalty cards) can be used to support health research and the development of new interven-

tions. She will link retail loyalty card datasets with rich medical, genetic, early life environment and other records collected by the Avon Longitudinal Study of Parents and Children (ALSPAC). This will allow her to create a transaction data linkage framework for other longitudinal cohorts and population health. The fellowship will establish the feasibility of novel ways of assessing both health outcomes and associated lifestyle choices through objective measures of real-world behaviours reflected in retail shopping history data.

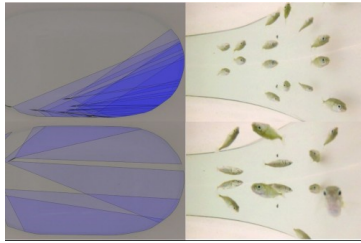
Dr [Dima Damen](#) (Computer Science) is co-investigator of a £6M **Engineering and Physical Sciences Research Council**

programme grant [Visual AI](#), in collaboration with the Universities of Oxford and Edinburgh. The project aims to develop the next generation AI of audio-visual algorithms.

The [COVID-19 Mapping and Mitigation in Schools](#) (CoM-MinS) project was supported by a £2.7M **National Institute for Health Research-UKRI** COVID-19 rapid response call. The team will test whether 5,000 staff and pupils have active or past COVID-19 infection, develop systems to help schools prevent and cope with an outbreak and assess strategies to support the mental wellbeing of the school community now and moving forward. [Read more](#)

Disorder in fish shoals may reap rewards at dinner time

The advantages of animals foraging in an orderly group are well-known, but research has found an element of unruly adventure can help fish in the quest for food. The study sheds new light on why fish shoals switch frequently between behaving in states of extreme order and disorder. It found certain individuals perform better when the group is disordered because they are more observant and faster to find sources of food, while others excel by follow-



ing the orderly crowd and exploiting their more proactive peers. The findings reveal why swarm-like fish shoals are in a constant state of flux, as each fish vies for order or disorder to hold sway depending on the state in which they individually perform best. The unruly, more disruptive fish can have a competitive edge when it comes to foraging, since they are more alert and able to seek out new food sources which might escape the attention of others. The findings provide food for evolu-

tionary thought and indicate the need for closer investigation to better understand the complex dynamics within collective animal behaviour and the importance of individual diversity.

MacGregor HEA *et al.* (2020). [Information can explain the dynamics of group order in animal collective behaviour.](#) *Nature Communications*.

Binocular visual fields of three-spined sticklebacks in an ordered group (above) and in a disordered group (below). Groups of three-spined sticklebacks in the experimental arena as viewed underwater (right) © .James Herbert-Read and Hannah MacGregor

Childhood abuse can increase risk of heart attack

Individuals who have suffered maltreatment in childhood have a higher risk of cardiovascular disease (CVD). The study, which analysed the medical records of 89,071 women and 68,240 men aged 40-69 years and different types of CVD, such as heart attack and stroke, found that women who have suffered physical abuse as a child have a 50% higher risk of having a heart attack, while men have a 20% increase. Physical, sexual and emotional abuse, and neglect are consistently associated with cardiovascular disease (CVD). However, few studies have used medical

records, that are more reliable than self-report, and investigated different types of CVD, such as heart attack and stroke separately. The researchers found that associations of maltreatment with the different types of CVD (any CVD, hypertensive disease, ischemic heart disease and cerebrovascular disease) were similar across all the types of childhood maltreatment, however stronger associations were observed for ischemic heart disease (heart attack) and cerebrovascular disease (stroke). When differences between men and women were explored, they found stronger associations in women.

This study is particularly important as it will help clinicians identify individuals who might benefit from early screening and interventions to prevent cardiovascular consequences. However, more understanding is needed on how childhood maltreatment links to CVD and whether the pathways from maltreatment to CVD differ for men and women and by type of maltreatment.

Soares ALG *et al.* (2020). [Sex differences in the association between childhood maltreatment and cardiovascular disease in the UK Biobank.](#) *Heart*.

The **COH-FIT (Collaborative Outcomes study on Health and Functioning during Infection Times)** project is one of the largest surveys worldwide on the health impact of COVID-19 and is endorsed by the World Psychiatric Association. The study aims to identify risk and protective factors for physical and mental health problems and to guide strategies for remedying these problems. It involves 200 researchers from 35 countries, including Bristol,

and aims to help scientists understand how different countries have been affected by the pandemic. The study is an online survey project to identify risk and protective factors that will inform prevention and intervention pro-



COH-FIT project

grammes for the COVID-19 pandemic, and if other pandemics occur in the future. The study, led by clinicians Professor Christoph Correll from the US and Dr Marco Solmi from Italy, aims to collect data from around 100,000 participants. As of 26 June 2020 just over 60,800 people had completed the survey.

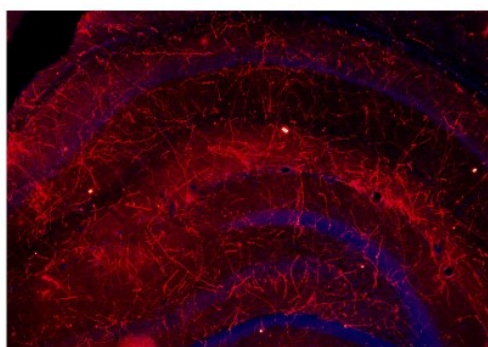
The survey is open to anyone interested in taking part in the study, it is available at: www.coh-fit.com.

How the brain encodes important memories

A study has found a novel mechanism by which noradrenaline improves information transfer in the hippocampus, a brain region involved in memory. Noradrenaline, a chemical commonly associated with the 'fight or flight' response, is a neuromodulator released into the hippocampus from brain-stem locus coeruleus neurons during emotional or novel events.

The team wanted to understand how noradrenaline could influence information transfer within the hippocampus, which has been shown to dictate memory representations. To do this

they used a novel optogenetic approach, using light to stimulate targeted release of noradrenaline within hippocampal



Locus Coeruleus fibres in the Hippocampus

circuits.

The findings describe how noradrenaline release activated β -adrenoceptors and made hippocampal neurons more excitable, facilitating information transfer between neurons involved in memory formation. Moreover, targeted

release of noradrenaline indicated that the concentration, location and timing of noradrenaline release are crucial to memory formation during novel or salient events. This research is one small piece in this puzzle of how emotional context can control what memories we encode.

Bacon TJ, Pickering AE & Mellor JR

(2020). **Noradrenaline Release from Locus Coeruleus Terminals in the Hippocampus Enhances Excitation-Spike Coupling in CA1 Pyramidal Neurons Via β -Adrenoceptors.** *Cerebral Cortex*.

Key dementia research facility protected

One of the most important facilities supporting dementia research in the country will continue its help in the fight against the disease thanks to an award of £140,000 by Bristol dementia research charity BRACE.

The [South West Dementia Brain Bank](#) (SWDBB) is based at Southmead Hospital. It stores brain tissue donated specifically for dementia-related research and provides tissue samples for research laboratories far and wide. Research on brain tissue has played an invaluable role in the un-

derstanding of dementia to date and ongoing efforts to find a potential cure and treatments for dementia. Medical research, including research into dementia, has been hit hard by the restrictions enforced during the coronavirus pandemic. There are fears that many projects will not recover and even that some key research facilities will close. [BRACE](#) was able to award the grant that will protect the SWDBB's work into autumn 2021 because it had set aside funds before the start of the pandemic.

BRACE has had a close rela-

tionship with the SWDBB since the charity was formed in 1987. It has awarded multiple support grants to the SWDBB as well as funded research projects in the closely associated research laboratories of the [Dementia Research Group](#).

The SWDBB laboratory supports dementia research that has the potential to contribute to our understanding of the underlying diseases or to be of value to sufferers and their families. It is under the co-directorship of Profs Seth Love and Patrick Kehoe.

Preventing domestic abuse

A Somerset study into the most effective way to tackle domestic abuse has received a positive response from its first participants. Barnardo's in Somerset has been funded by the University of Bristol to deliver weekly groups to local men and improve safety for their partners, ex-partners and children. REPROVIDE is a two-year University of Bristol research study which began in March and offers weekly sessions of education and support. The first group of men have completed some of their sessions and are now encouraging others to step forward and take part. [The study](#), which

has been re-purposed to respond to COVID-19, tests the effectiveness of group sessions for men who are concerned about their abusive behaviour in relationships with women.

Led by Prof Gene Feder (Centre for Academic Primary Care), REPROVIDE is one of two studies to have been awarded Urgent Public Health Research national priority sta-

tus by the National Institute for Health Research (NIHR). Status is now available to research on severe mental health problems, expanding the scope beyond studies on COVID-19 therapeutics, vaccines and diagnostics. Research to date shows that the COVID-19 pandemic is having negative effects on individual and population mental health, as well as increases in domestic abuse. Emerging findings from general population surveys have highlighted [increased levels of anxiety and depression](#) compared with usual levels and [negative effects of lockdown](#) on wellbeing. [Read more](#)



Seeing through glass frogs' translucent camouflage

A team of scientists from the University of Bristol, McMaster University, and Universidad de Las Américas Quito, sought to establish the ecological importance of glass frog translucency and, in doing so, have revealed a novel form of camouflage. Using a combination of behavioural trials in the field, computational visual modelling and a computer-based detection experiment, the study reveals that, while glass frog translucency does act

as camouflage, the mechanism differs from that of true transparency. The frogs are always green but appear to brighten and darken depending on the background. This change in brightness makes the frogs a closer match to their immediate surroundings, which are predominantly made up of green leaves.



They also found that the legs are more translucent than the body and so when the legs are held tucked to the frog's sides at rest, this creates a diffuse gradient from leaf colour to frog colour rather than a more salient sharp edge. This suggests a novel form of camouflage: 'edge diffusion'.

Barnett J *et al.* (2020). [Imperfect transparency and camouflage in glass frogs](#). *Proceedings of the National Academy of Sciences (PNAS)*.

Learning Disabilities Mortality Review

People with learning disabilities in England continue to die prematurely and from treatable causes of death, the latest annual report from the Learning Disabilities Mortality Review (LeDeR) programme shows.

Treatable causes of death accounted for 403 per 100,000 deaths in people with learning disabilities, compared to just 83 per 100,000 deaths in the general population, according to the [University of Bristol's 2019 LeDeR Annual Report](#). The report, published on 16 July 2020, indicates that the majority of people with learning disabilities continue to die before reaching

the age of 65. In the general population, 85% of deaths happen at or after the age of 65, but in sharp contrast this is the case for just 37% of people with learning disabilities.

Of the deaths notified to the LeDeR programme in 2019, two-fifths of adults and almost a quarter of children died from pneumonia, an illness which is normally treatable in this country. These figures are very similar to the figures for deaths caused by

pneumonia published in the University's two previous annual reports.

The disparity between people with learning disabilities and the general population in relation to average age at death, causes of death, and avoidable causes of death remains substantial and urgent action is needed. The report presents findings from 3,195 reviews of deaths of people with learning disabilities notified to the LeDeR programme up to 31 December 2019, with a focus on information about the 2,126 deaths reviewed between 1 January and 31 December 2019.



Those who died the youngest

People from Black Asian and Minority Ethnic (BAME) groups tended to die at younger ages than white British people.

43% of deaths of children were from BAME groups.

People with profound and multiple learning disabilities also tended to die at younger ages. 46% of deaths of children had profound and multiple learning disabilities.



COVID-19 rapid evidence reviews

Researchers from across the University of Bristol are contributing to COVID-19 rapid evidence reviews, co-ordinated by the National Institute for Health Research Applied Research Collaboration West (NIHR ARC West). The rapid research aims to answer key questions from the local health and care system, such as how to manage patients with dementia who 'walk with purpose and intent', how to monitor COVID-19 symptoms remotely and the potential impact of COVID-19 on mental health.

Researchers are reviewing the available evidence and offering topic and methodological expertise to help NHS clinical commissioning groups (CCGs) and local authority public health departments plan how to respond to the COVID-19 pandemic.

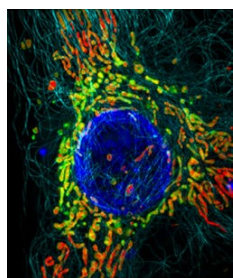
CCGs, local authorities and other organisations in the



health and care system on the front line of the COVID-19 pandemic are generating these urgent requests for evidence. The organisations are from across [ARC West's geography](#). The rapid [evidence reviews are published on the ARC West website](#) so that they are available nationally and internationally for others to use in planning their response to COVID-19. The Department of Health and Social Care has also been using these rapid reviews to aid the UK Government's response to COVID-19.

Prizes and awards: Part 2

The British Society for Cell Biology can their annual image competition earlier this year. First prize winner was [Hope Needs](#), a PhD student based in Biochemistry. Her research studies the role of mitochondrial protein import in neurodegenerative diseases. Her image shows a Structured Illumination Microscopy (SIM) image of a



HeLa cell expressing mScarlet localised to the mitochondrial matrix

(red). Mitochondrial membranes are shown in green

(MitoTracker Green), cell nuclei are labelled with DAPI (blue), and tubulin is shown in cyan. The image was taken using a DeltaVision OMX v4 imaging system (GE Healthcare).

Prof [Pete Cullen](#) (Biochemistry) has been elected to a Fellowship by the Academy of Medical Sciences. Fellows are chosen for contributions to advancing biomedical science via world-leading research discoveries, running national science communication and engagement programmes and translating scientific advances into benefits for patients and the public. Prof Cullen is internationally recognised for his iden-

tification and characterisation of the molecular mechanisms that orchestrate protein and lipid transport through the endosomal network, a complex intracellular maze found in all human cells.

His research has laid the foundations for understanding how altered function of the network contributes to an array of human diseases ranging from cardiovascular disease and neurological disorders, most notably Alzheimer's disease and Parkinson's disease, through to metabolic disorders such as type 2 diabetes, and subversion of the network by a wide range of viruses and bacteria.

When to choose a non-alcoholic drink?

More than 800 adults who drink alcohol every week took part in an online experiment designed by researchers from the [National Institute for Health Research \(NIHR\) Bristol Biomedical Research Centre \(BRC\)](#), the University of Bristol and the University of Cambridge. The experiment consisted of a hypothetical drink selection task, where participants were given one of four different conditions in which to make their selections.

Results showed that when the proportion of non-alcoholic drinks available was greater than alcoholic drinks, 49% of participants chose a non-alcoholic drink, including soft drinks and alcohol-free beer. When the proportion of alcoholic drinks available was greater than non-alcoholic alternatives, this dropped to 26%. The odds of participants selecting a non-alcoholic drink were 48% higher when the proportion of non-alcoholic options was increased and 71% higher when both the

total number and proportion of non-alcoholic options were increased. In real-world settings, like at a busy bar, people are likely to make drink choices quickly. However, the online study showed no evidence that giving some participants a time limit to make their selection affected which drink they chose.

Blackwell AKM *et al.* (2020). [The impact on selection of non-alcoholic vs alcoholic drink availability: an online experiment](#). *BMC Public Health*.

Slower growing chickens experience higher welfare

Slower growing broiler chickens are healthier and have more fun than conventional breeds of birds, new evidence from an independent commercial scale farm trial has shown. The majority of broilers produced for consumption are so called conventional, fast-growing breeds. This study is the first to highlight the welfare differences between fast and slower growing broilers in a commercial setting utilising a comprehensive suite of positive and negative welfare indicators. The researchers conclude that, while there are benefits of providing chickens with more space – by slightly lowering the animal densi-

ty, changing to a slower growing breed results in much better health and more positive experiences for these birds. The study was carried out by researchers from FAI Farms, the University of Bristol and The Norwegian University of Life Sciences

Broilers are motivated to perform a range of positive behaviours. These positive behaviours create positive experiences, resulting in enjoyment or pleasure.

Displaying positive behaviours



improves an animal's quality of life. Our seminal study found slow growing birds to have better health and perform more positive behaviours than conventional fast growing broilers. A shift away from fast-growing breeds would provide the most significant improvement for the lives of the 142 million chickens produced in Europe every week.

Annie Raynor,
FAI's lead researcher

Raynor A *et al.* (2020). [Slow-growing broilers are healthier and express more behavioural indicators of positive welfare](#). *Scientific Reports*.

Vulnerable children failing at school

One in seven of all children in England have a social worker at some stage during their schooling and are behind educationally by at least 30% by the age of 16 compared to their peers, according to new research.

The first-of-its-kind [study](#) investigated the educational achievements and progress of children who need a social worker, comprising Children in Need and Children in Care, during their school years and its findings have prompted national calls for

radical changes. There are currently nearly 400,000 Children in Need in England, meaning they have a social worker but usually live with their parents or family. Children who have ever been 'In Need' fell prey to an educational attainment gap, on average, of between 34 - 46% in their GCSEs. Children who have ever been in Care, who tend to live away from family with foster carers or at a residential home, number more than 78,000 and, overall, achieved 53% lower at 16. The joint study with the University of Oxford's Rees Centre, which

was funded by the Nuffield Foundation, showed both Children in Need and Children in Care had already fallen significantly behind other children at school by the age of seven, lagging by between 14-24% at Key Stage 1.

Berridge D *et al.* (2020). [Children in Need and Children in Care: Educational Attainment and Progress](#). Nuffield Foundation.



Conducting sensitive research during a pandemic

By [Alison Gregory](#), [Emma Williamson](#) and [Maria Barnes](#) (Bristol Medical School)

The coronavirus lockdown halted face-to-face research for several months. For many qualitative researchers, this wasn't a large problem, and merely required a switch to online platforms. For those working in the field of domestic violence and abuse (DVA), however, there were [fears about lockdown escalating abuse](#) (including for research participants), and these concerns raised questions about who should continue to be interviewed, what enhanced safety measures were needed,

and the [impact](#) that conducting this work from home has on researchers.

The first challenge was the heightened difficulty in assessing safety; it is absolutely paramount that researchers are able to accurately evaluate participants' welfare, but interviewing by phone or online does not allow a way of knowing who else is in the room, or likely to walk past, listen or interrupt. The second issue is that, given concerns about the virus disproportionately impacting communities already experiencing inequalities, including poverty, ethnicity, disability and age, researchers had to consider how technologies would work for these different

groups, and whether participants could access the means to connect. Interviews conducted during lockdown were longer, in part because many people had more time than they would usually to reflect on issues that are affecting them, to think in advance about what they want to say regarding the research, and possibly feel more confident in their home environments to be more expansive. Despite the challenges, DVA researchers at the University of Bristol identified tools they found helpful to process their work and install boundaries.

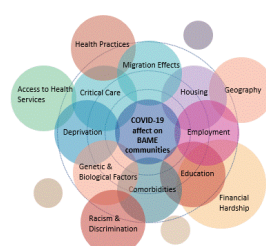
[Read the full article on TransformingSociety](#)

The impact of COVID-19 on ethnic minorities

The risk of death from COVID-19 is higher among black, Asian, and minority ethnic (BAME) people than the white British population. An Applied Research Collaboration (ARC) West rapid review commissioned by Bristol City Council and led by Drs [Loubaba Mamluk](#) and Tim Jones explores why this is the case and offers a summary of policy recommendations that could help reduce these health inequalities. They found a complex mix-

ture of factors, including being poorer, where people live, overcrowded housing, types of job, other illnesses and access to health services, all influenced BAME communities' outcomes; no one factor alone could explain all of the disparities found.

Recommendations that the review uncovered include:



- Ensuring adequate income protection for those in low paid or precarious employment, so work-

ers can follow quarantine recommendations

- Reducing occupational risks, such as providing appropriate personal protective equipment (PPE)
- Providing culturally and linguistically appropriate public health, developed with affected communities and tailored to culturally specific challenges
- Removing all NHS charges during this public health emergency could ensure that no migrant or individual from a BAME group delays seeking healthcare and risks death

Materials on COVID-related changes to health law

Prof [John Coggon](#) (Centre for Health, Law, and Society), in collaboration with the UK Faculty of Public Health, PolicyBristol and colleagues in Law Schools at Cardiff University, the University of Edinburgh, and Queen's University Belfast, is leading an Elizabeth Blackwell Institute-funded project to track and analyse COVID-19 related developments in law and policy as these apply to health professionals and the contexts in which they work.

The public health emergency created by the outbreak of SARS-CoV-2 has led

to governments across the world instituting extraordinary legal and policy measures. Across the UK, these initially included a general lockdown and changes to shore up workforce capacity within the NHS. As the lockdown situation has eased, the regulatory questions have grown more complex, with more varied and localised measures being implemented. At the same time, professional, regulatory, and advisory organisations have been issu-

ing guidance with a view to coordinating practical responses to the pandemic.

This project analyses developments in law and policy with reference to concerns about public health ethics, social justice, the protection of human rights, and respect for the rule of law. It also monitors these changes as they apply to health professionals and the contexts in which they work across the four nations of the UK. As

part of the project, a series of [explanatory resources](#) has been generated.

[View the resources](#)



Researching drug use during a pandemic

Researchers from the Universities of Bristol and Bath are working with Bristol Drugs Project (BDP) to explore the experiences of people who inject drugs during the COVID-19 pandemic. In the [Living Under COVID-19 and Injecting Drugs in Bristol](#) (LUCID-B) project, researchers are conducting phone interviews with BDP service users and rapidly analysing the results.

COVID-19 highlights the social, economic and health disparities in society, with marginalised groups experi-

encing the heaviest burden from both the disease and measures to reduce transmission. People who inject drugs are a vulnerable population; it increases the risk of COPD and immune system diseases, making them more likely to fall into high-risk categories. Distancing and isolation were key to stopping COVID-19's spread but the need to buy drugs would regularly bring people into contact with others. This put people who inject drugs at high-risk of catching and spreading the virus. Alongside these risks there was concern on the effects on people's drug use.

The pandemic resulted in widespread changes to health services in the UK, including drug services. People who are addicted to heroin are often prescribed opiate substitutes, such as methadone; typically they will visit a pharmacy daily to pick up and consume methadone. As lockdown hit, many treatments were altered so they were given enough methadone to self-administer for a few days or weeks at a time.

[Read the full briefing](#)

Reforming the immigration system to avoid trauma

Since 2012, British citizens seeking to bring a foreign partner to live with them in the UK have had to meet a Minimum Income Requirement (MIR) of £18,600, with additional sums for each child who is not a British citizen, for at least six months before making a visa application. This is higher than the income of nearly half of the working population. Alternatives based on saving are similarly out of reach for many. Visa and test fees total over £7000. One in five applications are refused, and although appeals commonly succeed, they increase time and expense. Couples and

families are therefore separated for periods ranging from several months to several years. Some cannot afford to apply at all and so remain apart indefinitely. After Brexit these rules will also apply to applications by British families with EU members, adding to the tens of thousands of British citizens' lives already harmed by these policies.

The 'Kept Apart' project, funded by the University of Bristol's

Brigstow Institute, brought ten members of Reunite Families UK (a support and campaigning organization) together with academics specializing in transnational families and immigration law, in a Trauma Awareness listening project, to

co-produce prose-poetry, illustrations and case studies exploring the impacts of this enforced separation.

[Trauma Awareness](#) provides training and research raising awareness of the impact of trauma.



[Read more](#)

Helping stop child exploitation

Researchers in the [Cyber Security Research Group](#) and [Visual Information Laboratory](#) at the University of Bristol, together with colleagues at Lancaster University, have developed an approach that combines Artificial Intelligence and Machine Learning to flag new and previously unknown child sexual abuse media automatically. Known as iCOP, this tool is already helping law enforcement to catch and prosecute

abusers. The Bristol team has just received funding from the [End Violence Against Children Fund](#) to extend this work into South East Asia.

The new AI-based tool will provide law enforcement with sophisticated techniques to apprehend perpetrators and,

ultimately, safeguarding victims. The solution proposed in this project will allow law enforcement investigators in South East Asia to automatically:

- detect victims at acute risk;
- assign degrees of importance and urgency to items of evidence in order to assess online child sex offenders' potential danger to society;
- find useful evidence in a timely manner.

[Read more](#)



Reimagining the online world

Public opinion is largely shaped by online content people read and spread via social media. Platforms such as Google and Facebook serve as hubs, distributors, and curators; their algorithms help us navigate the online world but underlying the vast digital landscape is a sea of misinformation. In a new study researchers from the Max Planck Institute for Human Development, the University of Bristol, and Harvard Law School propose interventions to help users distinguish misinformation from fact and promote a more democratic internet with autonomy and transparency.

More than half of the world's internet users use social media or search engines to keep up with the news; their aim is to keep users happy for as long as possible so that they stay online. This is achieved by providing entertainment and establishing a feeling of well-being. This can be particularly harmful in times of crises where misinformation and conspiracy theories have undermined compliance with public-health measures and have even given rise to extensive vandalism. Newsfeed algorithms only show users content that - based on their previous online behaviour - they are likely to agree with. Other points of view tend not to be

shown at all. This creates networks of like-minded users, which reinforce shared opinions and create the illusion of broad support, even if an opinion is actually not widely held. The research team has developed specific recommendations to empower individuals online, drawing on two approaches from the behavioural sciences: nudging and boosting.

Lorenz-Spreen P *et al.* (2020). [How behavioural sciences can promote truth, autonomy and democratic discourse online](#). *Nature Human Behaviour*.

Triggering the urinary response

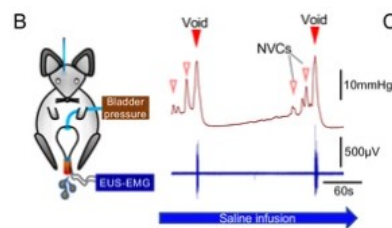
Micturition requires precise control of bladder and urethral sphincter via parasympathetic, sympathetic and somatic motoneurons. This involves a spino-bulbospinal control circuit incorporating Barrington's nucleus in the pons (Barr). Ponto-spinal glutamatergic neurons that express corticotrophin-releasing hormone (CRH) form one of the largest Barr cell populations.

Barr^{CRH} neurons can generate bladder contractions, but it is unknown whether they act as a simple switch or provide a high-fidelity

pre-parasympathetic motor drive and whether their activation can actually trigger voids. Combined opto- and chemo-genetic manipulations along with multisite extracellular recordings in urethane anaesthetised CRH^{Cre} mice show that Barr^{CRH} neurons provide a probabilistic drive that generates co-ordinated voids or non-voiding contractions depending on the phase

of the micturition cycle. CRH itself provides negative feedback regulation of this process. These findings inform a new inferential model of autonomous micturition and emphasise the importance of the state of the spinal gating circuit in the generation of voiding.

Ito H, Sales AC, Fry CH, Kanai AJ, Drake MJ and Pickering AE (2020). [Probabilistic, spinally-gated control of bladder pressure and autonomous micturition by Barrington's nucleus CRH neurons](#). *eLife*.



Better Care South West Partnership

A new partnership led by the University of Bristol that will join up data and improve patient care in the South West was announced by Health Data Research UK (HDR UK) in April 2020. The HDR UK Better Care South West Partnership is being awarded £1.2 million over three years to drive forward data-led research projects and join up the region's considerable health data expertise.

The partnership is a collaboration of health and social care providers with the Universities of Bristol, Exeter and Bath. Key healthcare

partners include Bristol, North Somerset and South Gloucestershire Clinical Commissioning Group, South Central and West Commissioning Support Unit, North Bristol NHS Trust and University Hospitals Bristol and Weston NHS Foundation Trust. It aims to address real-world health problems using the Bristol, North Somerset and South Gloucestershire (BNSSG) system-wide health and social care dataset, which is one of the largest linked health data sets in the UK. Enabling this joined-up approach is especially vital during the COVID-19 pandemic. This new initiative represents a step forward in using advanced analytics to

benefit patients and partner organisations. The partnership will lead on five data-driven projects, including personalised scores to reduce rates of unplanned admissions to intensive care, and optimised choice of antibiotics based on patients' individual history.

The Partnership will be led by Prof [Jonathan Sterne](#) (Bristol Medical School: Population Health Sciences).

HDRUK
Health Data Research UK

Research to tackle global challenges

GW4's pump-priming Generator Awards supported eight collaborative research communities exploring a range of societal, industrial, and global challenges. The scheme offers awards of up to £20K to support both existing communities planning to scale-up and achieve significant external funding, including those which have developed through GW4 programmes and initiatives, and new communities looking to establish their networks. The successful awards include:

- Moving Through Motherhood (PI: Dr Richard Pulsford, University of Exeter)
- Maternity leave in the UK – a gender gap closing policy? (PI: Dr Joanna Clifton-Sprigg, University of Bath)
- Transdisciplinary Network for Climate Change Education (PI: Prof Paul Howard-Jones, University of Bristol)
- SPIN: Secrecy, Power, and Ignorance research Network (PI: Dr Elspeth Van Veen, University of Bristol)
- GWPore: Porous materials for energy, healthcare and the environment (PI: Dr.

Asel Sartbaeva, University of Bath)

- GW4 Neurodevelopmental Neurodiversity Network (PI: Dr Punit Shah, University of Bath)
- GW4 Rhetoric in Society (PI: Dr Paul Earlie, University of Bristol)

The projects are expected to take place over 7 months and were launched over the Summer.

GW4

Neurological complications of COVID-19

Concerns regarding potential neurological complications of COVID-19 are being increasingly reported, primarily in small series. Larger studies have been limited by both geography and specialty. Comprehensive characterisation of clinical syndromes is crucial to allow rational selection and evaluation of potential therapies. The aim of this study was to investigate the breadth of complications of COVID-19 across the UK that affected the brain.

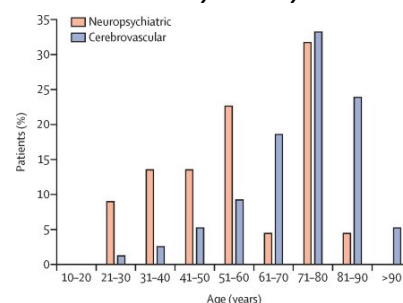
During the exponential phase of the pandemic, we developed an online network of secure rapid-

response case report notification portals across the spectrum of major UK neuroscience bodies, comprising the Association of British Neurologists (ABN), the British Association of Stroke Physicians (BASP), and the Royal College of Psychiatrists (RCPsych), and representing neurology, stroke, psychiatry, and intensive care.

Altered mental status was the second most common presentation, comprising encephalopathy or encephalitis and primary psychiatric diagnoses, often occurring in younger patients. This study provides valuable and timely data that are urgently needed by clini-

cians, researchers, and funders to inform immediate steps in COVID-19 neuroscience research and health policy. The work highlights the importance of interdisciplinary work in the clinical neurosciences field in the COVID-19 era.

Varatharaj A *et al.* (2020). [Neurological and neuropsychiatric complications of COVID-19 in 153 patients: a UK-wide surveillance study.](#) *The Lancet Psychiatry.*



Loneliness today could result in depression later

Children and adolescents are likely to experience high rates of depression and anxiety long after current lockdown and social isolation ends and clinical services need to be prepared for a future spike in demand, according to the authors of a new rapid review into the long-term mental health effects of lockdown.

The research draws on over 60 pre-existing, peer-reviewed studies into topics spanning isolation, loneliness and mental health for young people aged four to 21. According to the review

— led by the University of Bath in partnership with researchers at Bristol, UCL, Reading and Edinburgh - young people who are lonely might be as much as three times more likely to develop depression in the future, and that the impact of loneliness and depression could last for at least 9 years.

The studies highlight an association between loneliness and an increased risk of mental health problems for young people. There is also evidence that duration of loneliness may be more important than the intensity of loneliness in increasing the risk of future de-

pression among young people. This, say the authors, should act as a warning to policymakers of the expected rise in demand for mental health services from young people and young adults in the years to come - both here in the UK and around the world.

Loades ME *et al.* (2020). [Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19](#). *Journal of the American Academy of Child and Adolescent Psychiatry*.

Persistent racism affects employment

The employment prospects of some ethnic minorities have improved since the 1970s but still lag behind the white majority because of “persistent racism”. The research revealed that despite progress, most ethnic minority groups studied are still more likely to be in manual work or unemployed or sick than their white counterparts. The researchers analysed national census data on more than 70,000 people in England and Wales. The team found that:

- In the 1971 census men in five of the seven ethnic minority groups studied had a rate of unemploy-

ment or sickness higher than that of white men, a figure that rose to six groups in the 2011 census.

- Women in six of the seven ethnic minority groups had a rate of unemployment or sickness higher than white women in the 1971 census, a figure that stayed the same in the 2011 census.
- In the 1971 census men in six of the seven ethnic minority groups were more likely to be in a manual job than white men, a figure that fell to four groups in the 2011 census.
- In 1971 women in six of the seven ethnic minority groups were more likely to be in a

manual job than white women, a figure that fell to four groups in the 2011 census.

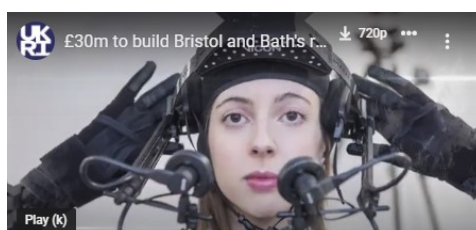
There is sufficient consistency to suggest that this is a problem produced and perpetuated at the societal level. Addressing these inequalities will not be resolved by a focus on particular individuals or cultures and their perceived limitations, rather the focus should be racism, discrimination and their consequences.

Karlson S *et al.* (2020). [Ethnic, Religious and Gender Differences in Intragenerational Economic Mobility in England and Wales](#). *Sociology*.

Creating innovative screen-based experiences

An initiative led by the University of Bristol and launching later this year will develop major new research and development facilities and partnerships connecting regional and national partners with global tech giants, including Netflix, Google, and Microsoft. Together they will pioneer new digital formats and technologies, creating innovative experiences across fiction, documentary, games, and live performance. The MyWorld creative

hub has been awarded £30m from the UK Research and Innovation's Strength in Places Fund with a further £16m coming from an alliance of more than 30 industry and academic partners joining forces in the five-year scheme. In collaboration with the University of Bath, University of the West of England, and Bath Spa University, the



project will provide advanced training programmes and talent development feeding into an extensive knowledge exchange network. Screen-based technologies have transformed the way we interact with each other professionally and personally; uniting Bristol's world-leading interdisciplinary research with the very best creative talent, locally and further afield, will strengthen and expand these relationships, allowing us to collectively cross new frontiers.

[Read more](#)

Bat superpowers revealed

For the first time, the raw genetic material that codes for bats' unique adaptations and superpowers such as the ability to fly, to use sound to move effortlessly in complete darkness, to survive and tolerate deadly diseases, to resist ageing and cancer - has been fully revealed. In order to uncover bats' unique traits the Bat1K consortium led by researchers at University College Dublin, the Max Planck Institutes of Molecular Cell Biology and Genetics (Dresden), and the Max Planck Institute for Psycholinguistics (Nijmegen), with contributions from the University of Bristol, generated

and analysed six highly accurate bat genomes that are ten times more complete than any bat genome published to date. To uncover genomic changes that contribute to the unique adaptations found in bats, the team systematically searched for gene differences between bats and other mammals, identifying regions



of the genome that have evolved differently in bats and the loss and gain of genes that may drive bats' unique traits. Genome scans revealed changes in hearing genes that may contribute to echolocation and expansions of anti-viral genes. The remaining ~1,400 living bat species exhibit an incredible diversity in ecology, longevity, sensory perception and immunology, and numerous questions still remain regarding the genomic basis of these features.

Jebb D *et al.* (2020). [Six reference-quality genomes reveal evolution of bat adaptations.](#) *Nature*.

Mapping population mental health concerns and COVID

The 2020 Coronavirus pandemic is a major international public health challenge. Governments have taken public health protection measures to reduce the spread of the virus through non-pharmalogical measures. The impact of the pandemic and the public health response on individual and population mental health is unknown.

A research team used Google Trends data (1 Jan - 1 Apr 2020) to investigate the impact of the pandemic and government measures to curb it on people's concerns, as indexed by changes in search frequency for topics indicating mental dis-

tress, social and economic stressors and mental health treatment-seeking. They explored the changes of key topics in Google trends in Italy, Spain, USA, UK, and worldwide in relation to sentinel events during the pandemic.

Globally there appears to be significant concerns over the financial and work-related consequences of the pandemic, with some evidence that levels of fear are rising. Conversely searching for topics related to depression and suicide fell after the pandemic was announced, with some evidence that searches for the latter have risen recently. Concerns over education and access to medication appear

to be particular social stressors. Whilst searches for face-to-face treatments have declined, those for self-care have risen. Monitoring Google trends shows promise as a means of tracking changing public concerns. In weeks to come it may enable policy makers to assess the impact of their interventions including those aiming to limit negative consequences, such as government funded financial safety nets.

Knipe D *et al.* (2020). [Mapping population mental health concerns related to COVID-19 and the consequences of physical distancing: a Google trends analysis](#). Wellcome Open Research.

Award for IRISi (social enterprise against domestic abuse)

The creation of social enterprise company IRISi, which helps survivors of domestic violence and abuse get specialist help, has won a national award. Work by the University of Bristol to turn initial research evidence into a company, which has to-date helped save and improve the lives of 16,000 people, [scooped 'Deal of the Year' at the virtual KE Awards](#) on 24 June 2020, sponsored by UK Research and Innovation (UKRI). [IRISi](#), which is based in Bristol, was co-founded by the

University of Bristol's [Professor Gene Feder](#) and IRISi CEO, Medina Johnson, to promote and improve the healthcare response to gender-based violence through sustainable evidence-based interventions.

IRIS (Identification & Referral to Improve Safety), IRISi's flag-

ship intervention, is a specialist domestic violence and abuse training, support and referral programme for general practice teams that has been positively evaluated in a randomised controlled trial. The programme recently received a £1 million grant from London's Violence Reduction Unit. This funding is enabling local implementation of IRIS programmes across seven new boroughs, with the potential to support more than two million Londoners.



Early puberty and risk of self-harm

Boys and girls who experience puberty earlier than their peers have an increased risk of self-harm in adolescence a study has found. This is the first study to use the teenage growth spurt – an objective measure for the onset of puberty because it is based on height measurements taken in research clinics – to look at the relationship between the timing of puberty and self-harm. The findings could be used to help identify boys, as well as girls,

who are at increased risk of self-harm and develop early interventions to help reduce this risk. The research found that for both males and females, the proportion of participants reporting self-harm was highest among those with early peak height velocity (aPHV, the point in time when their height is increasing at the fastest rate) and lowest among those with late aPHV. For females, experiencing aPHV one year earlier was associated with a 15% increase in the odds of self-harm at

age 16 years; for males it was associated with a 28% increase. Self-report questionnaires indicated that for both males and females, the proportion of participants reporting self-harm was highest among those with early aPHV and lowest among those with late aPHV.

Roberts E *et al.* (2020). [Pubertal timing and self-harm: a prospective cohort analysis of males and females](#). *Epidemiology and Psychiatric Sciences*.

Supporting the bereaved

Researchers from a leading end-of-life charity have looked to 9/11 and other mass death events for approaches to support people bereaved through COVID-19.

The team from the Marie Curie Palliative Care Research Centre in Cardiff and the University of Bristol, led by Dr [Emily Harrop](#) (Cardiff) with senior authors Prof

[Anthony Byrne](#) (Clinical Director of the Marie Curie Palliative Care Research Centre, Cardiff) and Dr [Lucy Selman](#) (Bristol Medical School), conducted a [rapid review](#) looking at

which approaches were most effective in times of mass bereavement. The review identified six studies of bereavement support offered following manmade and natural disasters, from the 9/11 terror attacks to a support programme for Swedish survivors of the South East Asia Tsunami of 2004.

The review found that support was offered both for be-

reaved families and for non-bereaved victims experiencing other types of trauma such as post-traumatic stress disorder. Findings highlight the importance of culturally sensitive approaches to bereavement support, in particular given the over-representation of BAME groups in COVID-19 death rates.

Harrop E *et al.* (2020). [What elements of a systems' approach to bereavement are most effective in times of mass bereavement? A narrative systematic review with lessons for COVID-19](#). *Palliative Medicine*.



ELIZABETH BLACKWELL FUNDING

Nurturing
Research.
Improving
Health.



EBI Clinical Primer scheme

This scheme is aimed at clinically qualified medical, veterinary and dental trainees who are at an early stage of their career.

Closing date for applications is 23 October 2020

MRC Confidence in Concept (CIC)

With support from the MRC, the University has funding available to support health related translational projects which are at the stage of proof of concept (Confidence in Concept Awards).

Closing date for outline applications is 09:00 29 October 2020

EBI Identifying Candidates for Wellcome Trust Investigator Awards

This scheme is designed to support a small number of permanent academic staff at UoB within the first five years of their appointment, who are planning to apply for an Investigator Award from the Wellcome Trust. Applications will be accepted on a rolling basis. **Heads of School are asked to nominate** members of staff who can be eligible for this scheme by emailing ebi-health@bristol.ac.uk

EBI Workshop Support

Support interdisciplinary workshops in health research at new or emerging interface between two or more disciplines. **Applications are accepted on a rolling basis.**

Returning Carers Scheme

The University of Bristol is running a Returning Carers Scheme (RCS) to support academic staff across all faculties in re-establishing their independent research careers. **Applications are accepted on a rolling basis.**

EBI Seed Fund: Public Engagement with Health Research

Seed funding is available for health researchers who would like to deliver public engagement events and activities. **Applications are accepted on a rolling basis.**

FUNDING OPPORTUNITIES

Would you like to receive timely, tailored funding opps information?

Do you want to know what funding opportunities come up in your research area?

Get tailored funding alerts?

Research Professional provides access to an extensive database of funding opportunities, and can send out tailored alerts based on keywords that you input, ensuring that the funding alerts you receive are the ones you want to hear about. UoB staff and students have **FREE** online access to the database from any device – once you've registered then you can view upcoming funding opportunities from home or away, not just while on the University network.

You can search for funding information by discipline, sponsor, database searches, by recent calls or by upcoming deadlines. If you register for the site and log in, you'll be able to:

- **Set up automated funding opportunity email alerts** - **tailored according to your discipline and research interests**, an easy process that will take just a few minutes to set up through the use of keywords
- **Save searches and bookmarks** - store items of interest for future reference, download and email to colleagues
- **Sign up for higher education news bulletins** – want to hear about what is going on in the broader HE environment? Latest news on the REF, setting up of UKRI etc? Sign up for the 8am playbook or the Research Fortnight news publications and stay up to date with the latest news.

Find out more about **Research Professional** on the [RED website](#). Note that some calls may have an internal process; do always remember to check the [major bids webpage](#) to see if there is an internal process in place.

The following listings represent a *brief selection* of available funding for the Bristol Neuroscience community. **Full listings of opportunities** are sent out via Faculty Research Directors and/or School Research Directors, and **are available on the [Research Development website](#)**.

Research Professional

Gruber Foundation

[Neuroscience prize](#)

Closing date: 15 December 2020

Award amount: USD\$500,000

This recognises scientists for major discoveries that have advanced the understanding of the nervous system. Individuals who are active in or have an appreciation for contemporary neuroscience research and study may nominate individuals from anywhere in the world who have conducted distinguished research in the field of the brain, spinal cord, or peripheral nervous system are eligible.

National Institute on Aging (US)[Alzheimer's drug development programme \(U01 clinical trial optional\): AIDS-related](#)

Closing date: 7 January 2021

Award amount: USD\$500,000,000

This supports preclinical and early stage clinical development of small-molecule and biologic therapeutic agents that prevent Alzheimer's disease, slow its progression or treat its cognitive and behavioural symptoms. Funding is for therapy development activities such as medicinal chemistry, pharmacokinetics, absorption, distribution, metabolism, excretion, toxicology, efficacy in animal models, formulation development, chemical synthesis under good manufacturing practices, investigational new drug enabling studies, and initial phase I clinical testing.

Alzheimer's Research UK[Race against dementia fellowship](#)

Closing date: 20 January 2021

Award amount: £500,000

This supports early-career scientists in their pursuit of innovative solutions to the big questions in dementia research. The objectives are to:

- accelerate progress towards research breakthroughs through innovative and ambitious dementia research
- provide early-career dementia researchers with a unique package of flexible funding and developmental opportunities to fast-track their progress towards becoming independent research scientists
- facilitate diverse secondments that foster interdisciplinary and inter-institutional interactions on a global scale

Medical Research Council[Programme grants - neurosciences and mental health](#)

Closing date: 27 January 2021

Award amount: £500,000

These provide large, long-term and renewable programme funding to help the medical science community think bigger. Programmes must include a coordinated and coherent group of related projects, which may be developed to address an interrelated set of questions across a broad scientific area.

National Institute for Health Research[Health services and delivery research programme – researcher-led workstream: 20/113](#)

Closing date: 4 February 2021

Award amount: unspecified

This supports research that produces evidence to impact on the quality, accessibility and organisation of health and social care services. The workstream is open to all relevant research areas but it also has a continued interest in the following fields: dementia; surgical and implantable devices; primary care interventions; very rare diseases; long-term conditions in children; multimorbidities in older people; prevention and treatment of obesity; mental health; chronic pain.

SHOWCASED ARTICLE

Accelerated long-term forgetting in healthy older adults predicts cognitive decline over one year

Wearn AR, Saunders-Jenkins E, Nurdal V, Hadley E, Knight MJ, Newson M, Kauppinen RA & Coulthard EJ (2020). *Alzheimer's Research and Therapy*.

Background: Here, we address a pivotal factor in Alzheimer's prevention—identifying those at risk early, when dementia can still be avoided. Recent research highlights an accelerated forgetting phenotype as a risk factor for Alzheimer's disease. We hypothesized that delayed recall over 4 weeks would predict cognitive decline over 1 year better than 30-min delayed recall, the current gold standard for detecting episodic memory problems which could be an early clinical manifestation of incipient Alzheimer's disease. We also expected hippocampal subfield volumes to improve predictive accuracy.

Methods: Forty-six cognitively healthy older people (mean age 70.7 ± 7.97 , 21/46 female), recruited from databases such as Join Dementia Research, or a local database of volunteers, performed 3 memory tasks on which delayed recall was tested after 30 min and 4 weeks, as well as Addenbrooke's Cognitive Examination III (ACE-III) and CANTAB Paired Associates Learning. Medial temporal lobe sub-region volumes were automatically measured using high-resolution 3T MRI. The ACE-III was repeated after 12 months to assess the change in cognitive ability. We used univariate linear regressions and ROC curves to assess the ability of tests of delayed recall to predict cognitive decline on ACE-III over the 12 months.

Results: Fifteen of the 46 participants declined over the year (≥ 3 points lost on ACE-III). Four-week verbal memory predicted cognitive decline in healthy older people better than clinical gold standard memory tests and hippocampal MRI. The best single-test predictor of cognitive decline was the 4-week delayed recall on the world list ($R^2 = .123$, $p = .018$, $\beta = .418$). Combined with hippocampal subfield volumetry, 4-week verbal recall identifies those at risk of cognitive decline with 93% sensitivity and 86% specificity ($AUC = .918$, $p < .0001$).

Conclusions: We show that a test of accelerated long-term forgetting over 4 weeks can predict cognitive decline in healthy older people where traditional tests of delayed recall cannot. Accelerated long-term forgetting is a sensitive, easy-to-test predictor of cognitive decline in healthy older people. Used alone or with hippocampal MRI, accelerated forgetting probes functionally relevant Alzheimer's-related change. Accelerated forgetting will identify early-stage impairment, helping to target more invasive and expensive molecular biomarker testing.

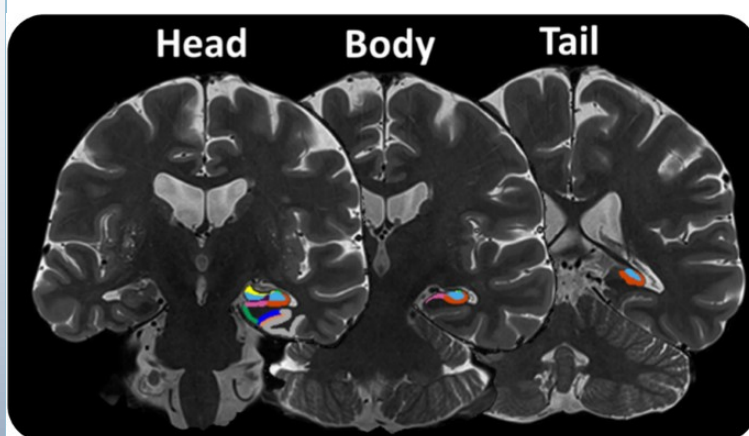


Image: MTL subfield mask example. Three skull-stripped coronal sections of summed-over-echoes T2-w scan of a single participant are shown with anterior MTL (head) on the left and posterior hippocampus (tail) on the right. Shown are subfields CA1 (red), CA2 (light green), CA3 (yellow), DG (light blue), EC (dark green), BA35 (dark blue) and BA36 (grey)

CONTACTS



Bristol Neuroscience

Director: [Matt Jones](#), Professorial Research Fellow in Neuroscience

Memory Hub Leader: [Jack Mellor](#), Professor in Neuroscience.
Area of research - synaptic plasticity and its role in learning and memory



Movement Hub Leader: [Jeremy Burn](#), Senior Lecturer Dynamics and Control. *Area of research* - modelling, simulation and control of civil, mechanical and aerospace engineering systems



Neural Computation Hub leader: [Conor Houghton](#), Reader in Computational Neuroscience. *Area of research* - understanding information processing and coding in the brain



Sleep Hub Leader: [Matt Jones](#) (interim), Professorial Research Fellow in Neuroscience. *Area of research* - neuronal networks in cognition and disease

Mental Health Hub Leader: in progress

Network Facilitator: [Jacqui Oakley](#) (Research Development)



Network Administrator: [Catherine Brown](#) (Elizabeth Blackwell Institute)

