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Strathclyde Pandemic Research Journeys

Personal accounts of research
during the Covid period

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**The Place of
Useful Learning**

Reflection and thoughts from across all the University of Strathclyde on our response to the worldwide Covid-19 pandemic.

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Professor David Littlejohn

Special Adviser To The Principal



The Covid pandemic affected society in a manner and scale not experienced for more than a generation. The impact persists and will do so for years, and not only on health and well-being. The pandemic has changed attitudes on how and where we work, disrupted education, exposed the perilous state of health and care services, and widened social inequalities. It has also prompted a re-assessment of building design and management, to create a healthier environment in which to live, work and learn.

The role of academics in designing viable vaccines to protect against the more severe effects of Covid is well documented. But academic endeavour and insight was, and continues to be, important in other aspects of daily life. Strathclyde, like many other institutions, contributed academic expertise through advisory groups and governmental committees in areas such as public health, modelling, vaccines, the built environment, and health impacts on individuals and vulnerable groups. This booklet is a collection of the personal thoughts of colleagues across the university who were involved one way or another in studies stimulated by the Covid pandemic. The range of topics illustrates the extent of the impact of Covid on society and demonstrates the broad-based expertise of Strathclyde academics who made, and continue to make, important contributions to understand the consequences of the pandemic and inform preparations for future crises.



The Heart of the Campus



Dr Grant Allan

Reader

Economics

Understanding the Impact of Covid on Scottish Tourism

Through 2020, we had seen the human toll of the first wave of the COVID-19 pandemic coming to the UK in March, and the impacts on previously normal daily activities, including work. Never before had we also seen such guidelines issued by governments, with significant impacts on the ways that workers and business undertook their activities. The devastation to whole sectors of the economy was immediately felt, in the normal functions of a university we wrestled with working from home, while students navigated guidance about the online delivery of teaching and assessment, so their studies could continue. Tourism activities were perhaps the most visible symbol of the initial phases of the COVID pandemic, with the grounding of cruise ships, an almost immediate cessation of international travel and stay at home orders.

In the months that followed, we had frequent discussions with collaborators outside of academia about how economic analysis might help them to understand the magnitude of the economic impacts on tourism, and the wider economy. We started putting together an application for a special UK Innovation and Research Council fund aimed at producing innovative ideas to address COVID-19 at the beginning of summer 2020 for a project that would focus on the tourism industry in Scotland. However, as the world started to open up again, we managed to take some holiday and thought that the worst was (potentially) behind us and that the research was no longer a priority, and we paused the project. We could not be more wrong!

With the end of the 2020 summer the spread of the virus started to get out of control very rapidly again and another lockdown was on the horizon. At this point we teamed up the existing links to VisitScotland through an SGSSS collaborative PhD scholarship and continued to develop and improve our funding proposal. We were told that the success rate for these projects was very low (about 10%) so at this stage we were not hoping too much, and we were also considering alternative funding avenues for doing the research. To our surprise, we heard news about our funding success in the middle of February 2021 and set to work right away!

Our research has shown just how interconnected tourism and the tourism industry is with the Scottish economy, and how reliant different sectors are on not only tourists from beyond our shores, but also from Scottish residents. We were able to show that domestic tourism – both day trips and trips including an overnight stay - would not be able to offset the decrease in visitor numbers and spending from the equally important international market. Our regional results also highlight those areas where employment and incomes were most at risk and also highlighted that the story wasn't simply an "urban/rural" or "coastal/interior" issue.

Although carried out remotely for the most part, the project was a great opportunity to work closely with the project partners, but also to discuss questions with the wider bodies involved in Scotland's policy response to the pandemic. I was particularly proud of the way that we managed to work well even when unable to meet in person. We would particularly like to say a huge thank you to the project partners, Raymond and Chris at VisitScotland as well as the wider community in Scotland's tourism policy for their deep engagement with our work. Without zoom or Teams, which we mastered with varying degrees of success, we simply would not have been able to produce the work over the timescales of the project.

The project has also benefitted from our ability to "visit" online academic conferences, stretching our conference budget well beyond the anticipated number of events, and giving us the opportunity to engage and take our research to academic audiences both in the UK and beyond. It was also a hugely important project for staff, enabling us to retain talented researchers to bring their skills to the work.

The project has maintained a website, showing details of all our blogs, datasets and some of our results of the analysis, which you can find here: <https://fraserofallander.org/research/economic-impacts-of-covid-on-the-tourism-economy/>



Dr Mark Carver

Research Associate

Education

New Teachers' Opportunities to Lead Covid-19 Response

Initial teacher education has long been interested in how leadership skills are developed in the early career phase. In particular, we want to know more about collaborative and informal leadership as part of a new teacher's integration into their school community. Covid-19 gave us an opportunity to look at this because the shift to emergency remote teaching flattened power structures. Local Authority guidance was too often slow to come, contradictory, or left gaps in its advice. Schools had to respond quickly and decide for themselves some principles to work from. At first, concerns about access to digital learning meant that all teachers were told to only cover old material so that any students who could not engage were not left behind. Others mobilised to deliver hard copy resources, computers, and even meals to children at home.

Thanks to some funding from the British Educational Research Association, I was able to collaborate with Rachel Shanks from the University of Aberdeen to run a series of focus groups during the first national lockdown. We anticipated that teachers may have been more tech savvy and so may be coping slightly better than other teachers. In part, this was confirmed, even in focus groups where the demographic was far from the clichéd 'digital native'. Teachers in our group described collaborative working involving teachers in their own school, other local schools, and even reconnecting with old classmates. They found practical ways to deliver on what senior teachers wanted, including streamlining homework submission, feedback, and notifications for parents. We ended the focus groups by asking the hypothetical question of how they might prepare for a second lockdown.

Unfortunately, we soon got to chance to test these answers. We brought the groups back together in the second lockdown and found fantastic examples of how these teachers were now supporting the professional development of their colleagues and changing how students engaged with online learning now that schools had moved past the 'no new material' stage to 'get ready for the exams' panic. We wanted to see how teachers made principled decisions in this time of uncertainty. Clearly, ensuring that no child was left behind was still important, but this could no longer be achieved by revising old material because progress needed to be made.

We found some practical examples of teachers using screen recorders to create tutorials for pupils and parents and even cases where distance-learning methods were found to be so effective that they were retained for pupil coursework even when a return to in-classroom teaching was possible. A good example of this was a music teacher who found that instrument practice and feedback was far more effective in online breakout spaces than what now felt like an overstimulating physical space. However, we also found some examples of skewed priorities, such as one school where students had to complete all their practical cooking tasks in one intense week so that there was 'evidence' for the exam, even if all that cooking happened before the learning that was meant to be evidenced.

As we look back on the pandemic and are tempted to repress the experience, we found the concepts of third space and teacher reflexivity useful, and have published papers using both as theoretical frameworks. Third space helped us to think about how disrupting existing power structures is helpful in creating new leadership opportunities and space for innovation. Reflexivity helped us to see the value of principle-led teaching in responding to new challenges. As we spoke to teachers in their return to 'normal' classrooms, it was also surprising to see how they talked down their own achievements. Some of these teachers were influential on learning across their schools and in other schools in their communities, changing the teaching and learning of hundreds of students and enabling pedagogical change for senior colleagues and building new digital engagement strategies with parents. If I had achieved any of that as a lecturer, I would be proudly talking about my impact and engagement, but teachers spoke about this more as something they did to keep themselves busy during lockdown. As well as creating opportunities and space for teacher reflexivity, my own reflections suggest that teachers need help to see themselves as having these impacts and being made to see the value of their lockdown achievements.



Dr Nicola Cogan

Senior Lecturer

School of Psychology

COVID-19 and mental health: Reflections from the frontline

Having worked in mental health services in the NHS for over 15 years as an applied clinical psychologist, I was recalled to the NHS at the beginning of the pandemic to provide mental health support and supervision to health and social care workers. I gained rapid insight into the significant impact that working on the frontline has had on the mental health and wellbeing of frontline workers. Frontline workers have been identified as being an 'at risk' group in terms of the adverse impact on mental wellbeing, moral injury and trauma during the COVID-19 pandemic. Indeed, UNISON identified a need to raise awareness of the latest evidence base for supporting frontline workers in dealing with trauma and post-traumatic stress disorder (PTSD) prior to the COVID-19 pandemic – this need was highlighted by stressors experienced during this pandemic.

As a direct result and funded by Scottish Union Learning, I led on the development and delivery of online trauma awareness training in collaboration and consultation with health and social care workers and this included interviews with 'experts by experience' - in other words, people who had experience of dealing with trauma in the workplace. The aim was to provide health and social care workers with an understanding of trauma, its impact, risks and protecting factors to mental wellbeing, impact of vicarious trauma, practical strategies for coping as well as advice as to when to seek professional help. To date, we have delivered over thirty webinar sessions, to over 600 health and social care workers since the onset of this pandemic – yet demand continues for these webinars to this day. We also adapted the training and delivered it to fire and emergency service workers and railway workers – essential keyworkers that are exposed to traumatic stress as an occupational risk within their working roles.

Complementing these direct interventions, I also led research funded by the Scottish government. We have completed online surveys and conducted qualitative interviews exploring the impact of COVID-19 on essential keyworker populations during the third lockdown period in Scotland. We were interested in not only understanding the risks to mental health and trauma-related conditions but also protective factors and important lessons learned to assist with the move towards the recovery phase of this pandemic. Our research found that health and social care workers were at risk of poor mental wellbeing, burnout and post- traumatic stress as a result of the stressors associated with the COVID-19 pandemic. Staff were experiencing low wellbeing and low levels of resilient coping while 49% met the cut-off for acute stress (if untreated this presents a risk for developing PTSD). This pattern was observed across NHS and non-NHS staff. Staff resilience was found to diminish as COVID-19 stressors increased.

A combination of adaptive coping and team resilience offered enhanced protection against COVID-19 stressors yet this buffering effect diminished as COVID-19 stressors increased. Our research found that health and social care workers were at risk of poor mental wellbeing, burnout and post- traumatic stress as a result of the stressors associated with the COVID-19 pandemic.

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I am very proud to say that the findings of our research have been incorporated into Health and Social Care Partnership Policies and Planning for COVID-19 recovery and staff wellbeing at a national level. We have also presented and published our findings nationally and internationally. This work also generated media interest and I engaged in a series of radio interviews and wrote a blog on '10 tips for protecting your mental health during the COVID-19 pandemic' which was published in a range of national newspapers. Our next step is to look for opportunities to continue this work through funded PhD studentships. We will continue to develop and deliver webinars, funded by Scottish Union Learning, to help frontline workers and managers to identify and prevent burnout and resilience fatigue in the workplace as we move towards the recovery phase of the COVID-19 pandemic. This body of work, both research and training has now enabled us to engage with civil servants working across a wide range of directorates within Scottish Government in developing and delivering webinars on working from home, hybrid working and mental health.

On reflection, perhaps the silver lining to emerge from the COVID-19 pandemic has been a willingness to embrace innovations (including digital health interventions), new ways of working and an increased awareness of the importance of staff wellbeing in delivering quality public services. These are extraordinary times. There is a pressing need to ensure that the tasks ahead do not cause long lasting damage to frontline workers – as psychologists, we have a critical role in further research, support and guidance to inform policies and intervention development in this essential area of investigation. A successful recovery period would be evidenced by good mental health and wellbeing outcomes, staff retention and resilience building. We must recover our frontline workers before we recover our services.





Malcolm M Combe

Senior Lecturer

School of Law

The Scottish response to the Covid-19 pandemic in the private rented sector

The pandemic presented a clear public health challenge. It also presented a regulatory challenge, with legal measure quickly put in place to prevent the spread of the disease across society. Some of these measures changed from time-to-time, leading to fresh issues in specific contexts. One area of specialism for me is public access to land. I wrote a blog post about how the Scottish right of responsible access (aka the right to roam) sat alongside the emergency measures that restricted movement for the Strathclyde Law Blog. This proved to be a popular post. That was actually the second of my pandemic posts. I also penned a blog post relating to the reforms in the Scottish private rented sector at the beginning of Lockdown 1, when all of the jurisdictions of the UK (and many jurisdictions around the world) took steps to ensure people were safe where they were, heavily regulating eviction process to do that.

Shortly after that landlord and tenant law blog post was published, I noticed a call for chapters from academic friends in South Africa, seeking contributions for an edited collection about the property law response to the pandemic. Using that blog post and some other research as a platform, and also incorporating some research Professor Peter Robson and I had undertaken for training sessions for CLT Scotland (which provided regulatory updates to practising solicitors), I set about turning that work into an academic publication. Several turns of peer review and editorial comments later, that work was published as the first chapter in Z T Boggenpoel, E van der Sijde, M T Tlale and S Mahomed (eds), *Property Responses to a Global Pandemic*, under the title *The Scottish response to the Covid-19 pandemic in the private rented sector*.



Damion Corrigan

Professor

Pure and Applied Chemistry

Development of a low cost, rapid, high throughput Covid-19 assay for isolation/back to work decisions for key workers

We identified the threat posed by SARS-CoV-2 in early January 2020 and set about applying to several funding schemes so that our team of interdisciplinary researchers could be involved in the effort to develop new diagnostic technologies for the virus. We were successful in receiving funding from the Chief Scientist Office (Scotland) and were able to recruit a number of project partners including: Lifescan Scotland, Aptamer Group, FlexMedical Solutions and NHC Greater Glasgow and Clyde to form a consortium to develop new diagnostic technologies.

Some of the PhD students and Post-Docs in the research group were able to suspend their studies and projects for six months to work on this challenging, fast paced but rewarding project. Not only were technical difficulties an issue, there were logistical ones to be faced too, which included reopening the University buildings and labs, getting deliveries of reagents and equipment onto campus and travelling into the Uni at the height of the pandemic. The project team showed great resilience and determination as we initially screened several research ideas, with some not working and some showing promise. Eventually we settled onto two ideas which were pursued fully, leading to two publications in leading interdisciplinary research journals. The final stages of the project involved a period of Covid-19 patient sample testing in the biosecure labs at Glasgow Royal Infirmary. This was undertaken jointly by students and Post-Docs from the Uni and the team at NHS GGC. The results which were produced enabled the University to secure investment from Norcliffe Capital to start a spin out company. Based on IP filed during the project, Aureum Diagnostics has now been formed with £3 million in private investment and will in the next 12-18 months attempt to commercialise simple, low-cost diagnostic assay for Covid-19 and a range of other diseases.

The project was very exciting but also a stressful time. To be working on the critical diagnostic technology challenge of the day in real time during a pandemic was an opportunity that not many scientists get. Balancing work, home schooling commitments for my daughter (my wife worked in the NHS at the time) and the needs of the other members of the research group who were not involved in the project was challenging and in many ways, I am still recovering from this. However, when I look back on the project I am left with an overwhelming sense of pride for how the investigators, researchers, industrial teams and clinicians all came together to work on something which whilst not being ready in time for use during the pandemic itself will give rise to better technologies for future pandemics and for low cost, ubiquitous healthcare screening more generally.





Ben Cooper

Knowledge Exchange Associate

Economics

Impact of pandemic response upon the Fraser of Allander Institute work and how it shaped future thinking

When the first lockdown was announced in March 2020, I was working for the Fraser of Allander Institute (FAI), situated within the Department for Economics. The FAI is an economic research unit specialising in Scottish and UK economy research, as well as providing a consultancy service to public, private and third sector organisations.

In the year leading up to the pandemic, the majority of our commissioned work focussed on assessing the economic impact of firms and other organisations within the Scottish and UK economy.

However, the pandemic changed the way of thinking, in that, clients who once considered what the data suggested about how a sector or firm might have performed historically, now wanted to know the impact that the pandemic would have going forward.

This led to work on multiple projects, most notably the Impact of Covid-19 on the Arran economy, and the impact of Covid-19 on the Renfrewshire economy. As well as these, we also worked on a number of briefings for the Northern Ireland Department for the Economy, assessing the economic impact of Covid-19 on the NI economy.

The Arran report found that its unique island economy relied heavily on ‘social spending’ and in particular, tourism spending – which was all but wiped out in the face of the pandemic. This meant that as government support began to wind down, Arran stood to be heavily impacted, something our report drew attention to as well as highlighting the support the island would need.

Further to this, the Renfrewshire report highlighted that despite the area having a relatively strong local economy, the impact of Covid-19 would be long and subsequent recovery slow. Within the report, a number of areas of investment were highlighted for Renfrewshire, in particular, areas that had the biggest potential in aiding the areas recovery.

There was also a sense of importance that we felt as the 'go to' economic research institute in Scotland to utilise our expertise to help in anyway we could. This feeling eventually turned to the publishing of weekly Real Time Indicator articles, detailing how the Scottish and UK economies were fairing given the latest available data.

On all of this work, the majority of our findings related to the negative impact that the pandemic was having and was likely to have.

In real time, regular increases in the number of business closures, the number of people being supported by furlough constantly rising and the projected future effects on the economy, meant it was hard to remain positive.

Whilst longer term work such as the Arran and Renfrewshire reports highlighted that areas that were already struggling pre-pandemic were likely to be much more negatively affected and would have slow recoveries.

I think the most challenging part to all of this work was not being able to switch off from the news and what was going on. A huge part of being able to produce these pieces of research is that you always have to have your finger on the pulse of the news and know what's having an effect on the economy and how big those effects were.

At a time when most of my worry was on whether I would end up unwell from the disease, there was also no respite from the news, with constant reminders of hospitalisation rates and case numbers, but also how much the economy was declining and the economic climate many households were finding themselves in. I often reflect on the period of the pandemic as bittersweet, because at a time when I was learning so much and contributing what felt like very important research at a pivotal time, was often overshadowed by a lot of anxiety and sadness around what was happening in the world.

That meant it was important when producing this research, to remember these statistics represented individuals and businesses, and that when the time came for the inevitable economic recovery, these reports would be invaluable in understanding how sectors and areas had been affected.

More positively, the high point was how well the FAI team responded to the pandemic. Beyond the rapid shift to homeworking and swapping our group office for zoom calls, the support for one another at a time when everyone was worried made me appreciate the team, I work in.

The nature of our work now has most definitely changed post Covid-19. Most of the research we produce now must consider the long-term effects of the pandemic and acknowledge how Covid-19 changed the way in which the world operates.

However, more importantly, the pandemic changed the way I think about my work, remembering to consider the hundreds, if not thousands, of individuals represented in the data that we analyse everyday.



Dr Kieren Egan

Senior Research Fellow

Computer and Information Sciences

Helping carers to undertake regular physical activity through the use of a novel codedesigned app

Across the world, the COVID-19 pandemic has had far reaching consequences, many negative, yet some positive. Looking back to 2020, it was a time that as a researcher I was looking to make a positive contribution to the seemingly insurmountable challenge that lay ahead, in whatever way I could. As an early career researcher in Computer and Information Science I had already started building up ideas and prototypes and had a growing understanding of the capacity of the University of Strathclyde to produce high-quality outputs-including within a short space of time. The project that I was inspired to lead was on the subject informal carers: family and friends who support another person on a regular basis through illness, frailty, or disability. To me, caring (in all its forms), in the midst of an emerging pandemic, seemed the most important that anyone could do.

In particular, I've been fascinated about informal carers for many years. I wanted to work with others to develop ways to help those who are facing a tough time through their caring role- for example 72% of caregivers face mental ill health and 61% of caregivers who face physical ill health according to U.K. national survey data. The focus of our project brought together a talented group of researchers across Computer Science and Physical Activity for Health with Support from Carers Scotland (UK). We had three key aims: to engage with carers and build the evidence base for improving physical activity and then to both build and test a smartphone application across up to 30 caregivers across Scotland for a period of 3 weeks.

Our main findings were that our novel approach to physical activity worked-caregivers found the approach acceptable and usable. We spent a lot of time focused on working out how to combine the current evidence base with expertise from both carers and professionals. The result was that our physical activity videos and educational materials allowed public health messages about physical activity $\frac{3}{4}$ previously bypassing many caregivers $\frac{3}{4}$ to land and in a number of cases inspire positive changes around physical activity.

Through careful iterative processes, we found a way to combine government guidelines and models of behavioural change into a single ‘app’, which we understand is the first of its kind. Throughout, listening to the voices of caregivers and professionals who support carers materially shaped our ideas—it’s important to recognise and act upon their views expressed.

The greatest part of the research for me was realising that the collaboration had made a real impact to the participants involved: many caregivers told us that they felt the instructor on the videos cared about them, that the concept made a difference around confidence and support, and that they would like to use our app in the future. The greatest challenge was time, as the project from start to finish was only 6 months. Yet due to the experience of the team, we had approaches and ideas ready, that could ensure authentic codesign and we are able to detail how we listened to our app users from the outset. You can read further about the work <https://pubmed.ncbi.nlm.nih.gov/34406969/>. A real hope I have for the future is that this work (with many others) will be used to make a healthier society- we also need to be better prepared for the pandemics that lie ahead. Collectively, this initial COVID-19 based grant has kick started a range of related funded work and it is an avenue that I very much hope will be make further impacts on our vital caregiver community in the not to distant future.





Paul Flowers

Professor

School of Psychology

Personal reflections on pandemic learning

As a leading behavioural scientist with a long history of research in behaviour change across a series of pandemics, the COVID-19 experience has been intensely rewarding yet at times, I have to confess, also frustrating. It still galls me to hear of ‘the pandemic’ or ‘the virus’ when the human immunodeficiency virus (HIV) and hepatitis C (HCV), amongst many others, continue to exact a global toll on health and wellbeing. I also think we still have much to learn from how communities and nations have already learned to live with a variety of infectious disease across time. Although my own research had effectively tracked individual, community and public health responses to HIV, HCV, swine flu (H1N1) and antimicrobial resistance nothing quite prepared me for COVID-19. The urgency, the unfolding and palpable tragedy, the lability of the SARS-CoV-2 virus, the pace of vaccine delivery was all breath-taking. Throughout this time, I have been involved in a series of very diverse research projects as well being privileged to work with Scottish government and provide scientific advice about behaviour change and implementation science.

One of these COVID-19 research projects has taken me into a new, and I think, fascinating domain: rapid whole genome sequencing of infectious disease. Although I had previously worked with infection, prevention and control (IPC) teams within hospitals as part of my AMR research, I had never done so within a rapidly unfolding and changing pandemic. The COVID-19 Genomics UK (COG-UK) consortium established a network of sequencing hubs, creating a distributed model of SARS-CoV-2 sequencing from National Health Service (NHS) hospitals. The COG-UK hospital-onset COVID-19 Infection study (COG-UK HOI) was a prospective clinical trial assessing the impact of sequencing and its turnaround time (TAT) on IPC outcomes across 14 UK hospitals. This study would never have been possible to conduct without COVID-19. The wake of COVID 19 overcame many structural and historical barriers to innovation in many areas. Here, it meant that for the first time it was possible to explore the use sequencing in real time to prevent further hospital onset infections. Sequencing provided new information to hospitals about when, and where, people were being infected. If there was capacity available, hospitals could then target their stretched IPC teams to where they were needed most. In this project, I have been lucky enough to lead the qualitative research engaging directly with the voices and experience of a variety of hospital staff.

My role has been to understand how staff changed their behaviour as a result of new information delivered through sequencing. At the same time, I explored how NHS hospital systems adapted to information about the time and location of COVID transmission occurring and how they tried to make changes to infection prevention and control to reduce further infections despite the surge in COVID cases. This qualitative work has complemented the wider outcome evaluation of the effectiveness of sequencing in reducing hospital onset COVID-19.

I do hope that now we may have the time to consolidate our learning for ongoing and future pandemics. I think there are a series of vital 'meta' research questions that we should be pursuing as a result of our experiences with COVID-19. I think we should now focus on examining what worked and what didn't within COVID-19 and useful knowledge exchange. How did governments and organisations make use of interdisciplinary expertise, how did they tap into and capitalise on theory and data sets? In the future, for example, I would love to explore the extent to which we effectively mobilised useful knowledge from previous pandemics and of course where, how and when we failed to do so. I would also like to focus on what can be learned from the series of rapid innovations that COVID delivered (e.g., whole genome sequencing for SARS-CoV-2, the rise and rise of the pre-print) and understand how we can maintain and build upon such pioneering work and the removal of so many barriers to change.



Dr Pablo Grez Hidalgo

Lecturer In Public Law

School of Law

Parliamentary accountability in the Coronavirus context in the UK

My main research interest is in non-judicial mechanisms of constitutional and legal protection, with an emphasis on political accountability and political institutions. I have been lucky enough to develop this research interest in the Covid-19 context by looking at parliamentary review of emergency responses in the UK context, looking across the four UK nations. I joined an AHRC funded research project led by Professor Fiona de Londras (Birmingham Law School), of which Daniella Lock (currently at the University of Oxford) is also part. Our research recorded, tracked and assessed parliamentary reviews of UK responses to the Covid-19 pandemic from a human rights perspective.

Parliamentary accountability comes under significant strain in situations of emergency. The public health emergency created by Covid-19 has been no exception to this trend. Governments have rightly sought to protect public health by adopting sweeping measures which enable them to craft a quick, effective and flexible response to an ever-evolving crisis. While governments across the world opted for constitutional and/or statutory enabling frameworks, the UK governments relied on a combination of pre-existing legislation and fresh legislation rushed through Parliament at the beginning of the pandemic. These enabling frameworks delegated significant powers to four UK governments to craft a quick, effective and flexible emergency response, including to adopt sweeping measures to protect public health known as 'Coronavirus regulations'.

From a legal perspective, these measures fulfil the State's positive obligations to protect the individual rights to life and health. However, measures such as stay at home orders, travel restrictions, mandatory closures of nurseries, schools and business, mandatory self-isolation, among others, have significant negative impacts on individual freedoms. These measures are adopted and enacted by the government, on the advice of medical and scientific officers, exercising powers delegated by Parliament. Nevertheless, Parliament has a role to play in scrutinising the government's response to the pandemic. We worked under the assumption that robust parliamentary scrutiny of the emergency response by the four UK parliaments enhances its legitimacy and quality.

Our research looked closely at parliamentary debates on the passage of Coronavirus-related primary legislation, parliamentary oversight of Coronavirus regulations, parliamentary renewal processes of emergency powers, select committees' inquiries, the fulfilment of governmental reporting duties and Prime Minister and First Minister's Questions. We sought for human rights-informed and evidence-based interventions, as well as for indicators of wider participation in parliamentary proceedings and independence from the government. We took these as desiderata for good quality parliamentary scrutiny.

We found that parliamentary scrutiny has been lacking in significant ways during the pandemic. This is due to a combination of factors such as fast-tracking Coronavirus-related Bills, excessive reliance on an emergency procedure to make Coronavirus regulations ('made affirmative procedure'), inadequate design of parliamentary renewals of emergency powers, and limited parliamentary engagement with human rights and evidence, among others. However, our close observation of parliamentary proceedings across the UK suggests that the marginalisation of Parliament in the pandemic context is not a product of Law in emergency times per se but, to a significant extent, of key constitutional actors' 'mindset' towards parliamentary accountability. In particular, the UK executive's unwillingness to subject itself to parliamentary accountability has thrown into sharp relief the contrast between constitutional mythology (i.e., parliamentary sovereignty) and constitutional reality (i.e., executive dominance).





Dr Tom Inns

Principal Research Fellow

Design, Manufacturing and Engineering Management

COVID as a catalyst for redesigning healthcare improvement. A new ecosystem mapping tool for co-designing change with case studies from NHS Tayside

In the 12 months running up to the COVID pandemic I was working with clinicians and healthcare improvement teams at NHS Tayside on the development of a new approach to healthcare quality improvement that integrated design thinking, tools and processes into quality improvement projects and training. These were launched in February 2020.

In March 2020 everything changed. The NHS Tayside Improvement Academy building was turned into a COVID Command Centre. Quality Improvement training and projects were put on hold and staff across the healthcare system braced themselves for the pending pandemic.

Over the following weeks Tayside's COVID experience mirrored that experienced by healthcare boards and trusts across the UK, cancellation of elective care, the challenges of an unknown virus, new ways of working and harrowing patient, family and staff experiences.

2 months into the pandemic, however, it was clear that something else had changed in NHS Tayside. Ideas that had been on the drawing board for months if not years were developed in days and deployed in weeks. Staff suddenly finding themselves working across areas of healthcare discovering new colleagues, meetings moved from choreographed, calendared encounters to agile online conversations, resources were suddenly unlocked. In June 2020, working with NHS Education for Scotland (NES), I was commissioned to run a series of Discovery Workshops with clinicians, nurses and managers from across Tayside's Primary and Secondary system to reflect on what these new ways of working were and establish what lessons could be learnt for the future. Findings were striking, silos and disciplinary boundaries had dissolved, a system with a shared purpose had emerged, communication had improved, rapid prototyping & testing of many ideas was being undertaken, all conditions synonymous with a culture of innovation.

To try and capture some of this new perspective on healthcare improvement, as an approach that might survive, when inevitably the system reverted to Business-as-Usual, UKRI COVID Recovery Project Funding was secured to develop a co-design tool that took a systems approach to healthcare quality improvement.

With this support, between Nov 2020 and April 2022, NHS Tayside, NES and the University of Strathclyde have developed a Healthcare Ecosystem Mapping Tool, effectively the healthcare equivalent of the Business Model Canvas. This allows a healthcare team to collectively map their ecosystem of healthcare, explore patient perspectives, the policy environment and the activity of peers. This shared visual map can then be used to review challenges, opportunities, the improvement landscape and future ways of redesigning the healthcare system. The approach has been developed in an iterative way through short-life projects with different healthcare teams in NHS Tayside, during this process ecosystem maps have been developed for Primary Care, Nursing in Care Homes, Pharmacy Services and Oncology Services.

With a growing interest in quality improvement at a systems level, the mapping methodology has recently been used to map Urgent Care pathways for NHS Tayside and NHS Borders and will soon be deployed in the Northern Ireland health care system. The Healthcare Ecosystem Mapping Tool will shortly be made available as an online open access resource.



Dr Xanne Janssen

Senior Lecturer

Physical Activity for Health

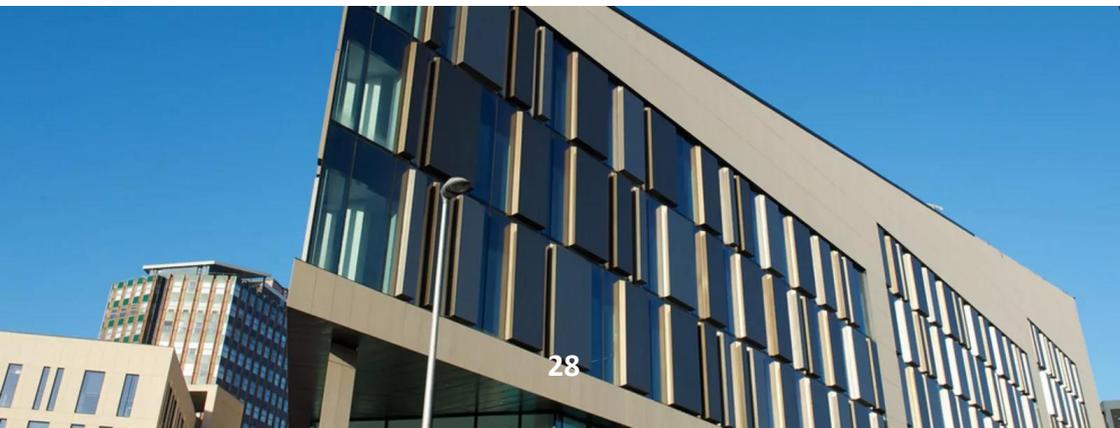
Has social distancing made us healthier? Adoption, maintenance and sharing of positive changes

Covid and the subsequent lock-downs had many negative influences on people's life. However, during lock-down I noticed that the forest trails around my home had become much busier with lots of families walking together. It made me wonder if the enforced time spent inside actually encouraged people to go outside and be active. It turns out I was not alone in wondering if the lock-down and social distancing was having unexpected positive outcomes on people's lives. So when the CSO COVID-19 response call came out, a team of people within Psychological Sciences and Health, led by Dr Lynn Williams, got together and developed a proposal to look at just this.

The aim of our project was to capture positive behaviour changes, explore who made these changes and how they managed to make these. We were also interested to see if these positive changes could be maintained when restrictions eased. We conducted online surveys during the height of the national lock-down (May 2020) and again when restrictions were easing (August 2020). We asked people to report on their sleep, sedentary time, physical activity and psychological factors such as coping and mood. We also interviewed people who, in the surveys, reported high levels of positive change during the lock-downs. What we found was that many people did experience positive changes but that the extent in which people experienced these changes depended on several socio-demographic factors. Women were more likely to report positive changes, as were those in the younger age group and those who were in a relationship. Those in very poor health were hit hardest and were least likely to report positive changes. Those that made positive changes told us they managed to do this as the lock-down gave them time to reflect and the opportunity to make plans and establish a routine.

They also told us that they started to use being active as a way to support their mental health and connect with nature in a new way. Lastly, they reported an increased sense of community and often reached out to people around them for social support more than they had done pre-COVID. Together with our project partners we developed resources to share our findings with the public which can be found [here](#).

Overall, this was a hugely productive and enjoyable project to work on. The work with our external project partners was very rewarding and seeing our results being shared with the public so quickly and efficiently was inspiring and definitely something to aim for in future projects. In addition to the public facing resources we also published blog in the Conversation. and three peer-reviewed papers: Sharing Positive Behavior Change Made During COVID-19 Lockdown: A Mixed-Methods Coproduction Study; What have we learned about positive changes experienced during COVID-19 lockdown? Evidence of the social patterning of change; and Changes in Physical Activity, Sitting and Sleep across the COVID-19 National Lockdown Period in Scotland.





Adam Kleczkowski

Professor

Mathematics and Statistics

Mapping the Pandemic

Since the pandemic's early days, the general public has shown considerable interest in the science underpinning public health decisions. Before the outbreak, such terms as herd immunity, or superspreaders, would only be meaningful to mathematicians working in the field of epidemiology. The outbreak of COVID-19 in 2020 changed that dramatically. Newspapers, radio and TV programmes started looking for experts who could explain these concepts in terms that could be understood even without specialist knowledge.

In March 2020 I was working on mathematical modelling of COVID-19, providing Public Health Scotland with predictions of the number of cases and hospitalisations. At the same time, I was approached by The Conversation UK to write a popular science article on what the future of the pandemic might look like. This article, *Four graphs that show how the coronavirus pandemic could now unfold*, was published online as early as 25th March 2020.

Since this first publication, I have authored fifteen more papers covering such topics as herd immunity, vaccination safety, lockdown efficacy, and, more recently, the future of the monkeypox epidemic. The papers reached a wide international audience and have been reprinted and translated worldwide.

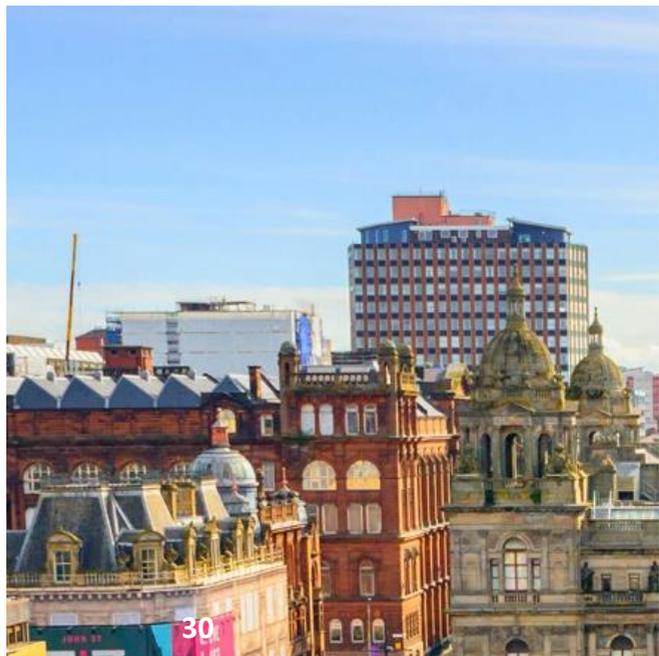
It has been an exciting but challenging journey, because it required a complete change in how science is written and communicated. Firstly, the article is often commissioned and needs to be written quickly, even if it requires substantial background reading and study. Secondly, there is a stringent word limit. A typical *The Conversation* article is only 800 words long. Being able to explain complex epidemiological concepts in terms that are understandable to the general reader in such a short space is a big challenge. The diagrams I prepared required much work but were very helpful in explaining complex concepts. They were used by Public Health Canada in their bulletins.

Thirdly, there is the need to use a language understandable by a broad audience. I often spent more time trying to shorten the sentences and paragraphs to adjust the readability than writing the first draft. The editors, both the commissioning ones and the people on the desk, were always a great help. I was always impressed with how patiently and skilfully they improved my pieces.

Finally, I found it challenging to open up my writing for comments from the general public, which were often critical, angry, and sometimes even unfair. Trying to strike a balance when writing on controversial subjects, like the impact of lockdowns, was particularly difficult.

I enjoyed working on the articles and learned a lot about some aspects of epidemiology and public health that I had never studied before. I also appreciated how popular science writing communicates complex and difficult topics in simple terms.

Although the cost sometimes seemed high - I probably could have written a few scientific papers instead - the benefits have been worth it. The public understanding of epidemiology and COVID-19 was much strengthened through my effort. I have felt that the public understanding of epidemiology and COVID-19 was much strengthened through my efforts, and that a broad audience found my writing interesting. This was demonstrated by invitations to be on BBC Radio 5, regional and World News, and BBC Channel 5, Polish, Turkish and South African TV channels.





Jillian MacBryde

Professor

Hunter Centre
for Entrepreneurship

Understanding the Impact of Covid-19 on UK Manufacturing

Early in the pandemic we started to hear reports of manufacturers shedding staff, for example in the May 2020 there were reports of Rolls Royce shedding 9000 jobs, closely followed by Alexander Dennis cutting 650 jobs. Newspaper headlines suggested 120,000 manufacturing job losses between the start of lockdown in March and May 2020. Together with colleagues at the National Manufacturing Institute, Scotland, myself and my PhD students had conversations about how the pandemic might affect UK manufacturing. At the outset we were worried we might see companies going out of business, putting pressure on supply chains, and making manufacturing in the UK more vulnerable. We looked to see if UKRI were already funding work in this area under their Covid scheme and discovered a gap. We applied and were successful in securing funding for 18 months to looking at the impact of the pandemic on UK manufacturing.

The first phase was to report on the impact of the pandemic on manufacturing companies. We used secondary data (from the media, reports from professional bodies etc), combined with primary data gathered from one-to-one interviews, and a survey. This resulted in a report on the initial impact of Covid on UK manufacturing (submitted to ESRC in May 2020). This work was discussed at various online events organised the High Value Manufacturing Catapult, and as part of the NMIS insights programme. At this point members of the team were also asked to contribute to the Scottish Government's plan for manufacturing "Making Scotland's Future – A recovery Plan for Scotland".

The second phase of the work was to look at future scenarios for manufacturing. Because we were working with colleagues in the manufacturing team at Scottish Government, for this phase we narrowed our focus down to creating scenarios for manufacturing in Scotland. We developed 4 possible scenarios and used these to work with companies in a sector impacted particularly by the pandemic (targeting companies involved with aerospace). This work was discussed at online events including an event organised by the IET in Sept 21. Using the academic literature, we developed an innovation framework and audit tool. Companies took part in workshops using the framework and too, as well as the scenarios.

The workshops helped them to think about potential futures and the innovation capabilities they need to develop for a stronger future. So there were very actionable insights from this phase of the work, with positive impacts for the companies who took part.

The third deliverable we had committed to was around understanding the role of innovation capabilities and looking at the policy levers. We hosted an event that involving policy makers, support organisations and manufacturing companies to discuss support that needed to support aerospace in Scotland. This helped identify some possible actions for the various stakeholders and gave us insights for policy makers, manufacturers and support organisations.

The overall the impact of covid on UK manufacturing was not as bleak as we expected and there were many positives. Some sectors were impacted more than others – with manufacturers involved in transport – particularly aerospace and automotive feeling the effects most, along with those supplying the hospitality industry. Innovation is seen as an imperative going forward – nearly everyone we interviewed talked of how important innovation was during the pandemic and is going to be going forward. We have investigated this further and have developed and tested a tool for manufacturers.

A key theme from both the interviews and the survey was the pandemic accelerating the digital journey. We saw examples of interviewees talking about how investment pre-covid had made the transition to home working easier, others who talked about investment in technology helping deal with social distancing restrictions, and examples of things like VR helping with remote maintenance and commissioning.

The vast majority of manufacturers continued to work providing essential goods during lockdowns, with most only having short periods of closure early on. People wanted to talk about the tangible differences in the way they work, about the transition to working from home, about issues of social distancing in the workplace and about the health and wellbeing of the workforce. Attitudes differed but many talked about being more mindful of health and wellbeing and personal circumstances. We also heard stories of people building stronger relationships while working apart, often contrary to what was expected.

Changes in supply chain – this varied across the sectors, within food and drink and life sciences especially people were talking about new partnerships. For some it was about working with local partners – we saw a lot of this within food and drink and some good examples as discussed earlier when talking about working together to solve a common problem e.g., PPE, hand sanitiser, ventilator challenge etc. Reshoring was something that came up in many interviews.

Whilst politicians and the press often present reshoring as an opportunity, in the interviews we conducted it was seen more as a worry for those employed by companies with headquarters not in the UK.

A considerable number of people we interviewed said they were worried about people, skills and talent in manufacturing going forward. Again, there were different conversations, with some concern about people leaving manufacturing, particularly the over 50s and the loss of years of experience. At the other end of the scale, others were worried about lockdown resulting in less people entering the sector including less apprentices, graduates, and young people. For those whose digital journey had been accelerated during the pandemic, they mentioned the new skills needed in a different working environment.

When we wrote the original research proposal we hadn't imagined the lockdowns and restrictions would continue as long as they did! So, an unplanned activity was that we decided to do follow up interviews with many of the companies we originally interviewed one year on to see what had changed over the longer term. Again, we were getting feedback that things had changed for manufacturers but for many there were positives as well as negatives. Unpicking the impact of Covid from other factors such as Brexit that impacted in the same timeframe was difficult in many situations. Whilst there were many practical benefits during this project, the team are now working to pull out more of the academic contributions and publish some findings.





Grant Reilly

Head Of Communications & Marketing

Digital Health & Care Innovation Centre (D.H.I.)

DHI's Response To Covid-19 Pandemic Emergency Years

Within the traumatic environment of the global Covid-19 pandemic, the accelerated adoption and development of digital services and solutions was one notable outcome with many businesses and citizens venturing on-line for the first time. Being tasked with the digitalization of the Scottish healthcare landscape, DHI happened to be the right organization at the right time in the right place.

In March 2020, DHI rapidly reviewed our priorities to create staffing capacity and pivoted our approach to enable rapid pace and scale to help address Scotland's response to Covid-19. Our entire team shifted to a virtual operating model within 24 hours. DHI became a fundamental part of the Scottish Government's national response to the Covid-19 pandemic. We undertook market research and international engagement to learn from other countries and inform Scotland's approach. We utilised our design and data infrastructure capability to rethink the whole model of care rather than just focus on individual products. Project ideas were delivered in short weeks rather than years and we worked with partners to scale them. This brought extra capacity to the system and enhanced credibility for DHI, with recognition that DHI is a fundamental component of the NHS innovation ecosystem.

DHI worked closely with key partners, including the Scottish Government's Digital & Digital Health & Care Directorates, NES Digital, NSS, Public Health Scotland, NHS 24 and the Technology Enabled Care Programme as well as territorial health boards, the Digital Office for Local Government, Scottish Care and key third sector and independent care sector organisations.

We utilised unique, co-design methods, tools and online platforms to ensure that human factors and need principally determine the design of digital solutions.

Using our position as a hub of digital innovation, we became a key partner for a broad range of academic, commercial and third-party organisations to innovate healthcare.

Our work now greatly benefits from the connections forged during the Covid pandemic.



Dr Itamar Megiddo

Senior Lecturer

Management Science

Evaluating interventions for mitigating COVID-19 in care homes

We started working with care homes and colleagues in the Health & Social Care Partnership (HSCP) Lanarkshire quite early in the pandemic, back in May 2020. HSCP approached us through a mutual colleague who knew we had started working on modelling to control infectious disease in health and care settings. At the time, Professor Susan Howick and I had a PhD student, Le Khanh Ngan Nguyen, who just joined our group and started working on infectious disease modelling, specifically in care homes. We quickly transitioned to focusing on COVID-19 rather than other communicable pathogens. We were determined to provide timely evidence-based recommendations. Nguyen was the driving force behind the work.

Shortly after our collaboration with HSCP Lanarkshire started producing fruitful outputs that helped with local decision-making, we started also working with other partners. In May-June 2020, we started providing reports on the best approaches to mitigate the spread in care homes to the Scottish Government (some are available on our [Long Term Care Response to COVID-19 project page](#)), and we joined the Scottish Government's Care Home Data and Analysis Team. In November 2020, we also started working with the Department of Health and the UK SAGE (Scientific Advisor Group for Emergencies) Social Care Working Group, where we contributed to the report on the [What are the appropriate layers of mitigations to deploy for care homes in the context of the post vaccination landscape and other analyses](#).

Our work focused on understanding the effects of interventions on disease transmission and health within a care home and between care homes connected by staff that work across multiple facilities. Nguyen interviewed care home and agency staff to improve understanding of the transmission pathways and implementation of interventions, and we developed simulation models, such as agent-based models, that are sufficiently detailed to capture important interactions.

A few of our key findings were that

- testing staff, who must continue close interaction with many residents, is far more important for reducing cases than testing residents, and the latter can be relaxed;
- restricting visitation has a limited effect on the outbreak risk in a care home, and if an outbreak occurs, it also has limited impact on the attack rate—the proportion of residents infection;
- system changes such as cohorting into smaller units with limited interaction between units significantly reduces the attack rate;
- and testing agency staff that work in multiple facilities significantly reduced the risk of new outbreaks, but creating bubbles of care homes and limiting staff movement to within these had a limited impact.

The project has also led to strong links with HSCP Lanarkshire, and we are currently working on developing new projects together. We learned a lot from our colleagues in care homes, HSCP Lanarkshire, and other partners. It was also very important to feedback what we learned at the different levels.

You can find more information in the papers we published about the early interventions that were implemented and testing strategy, visitation policy and cohorting, and interventions across connected care homes. You can also find information on infection control and prevention in Scottish care homes more broadly than COVID-19 in our earlier paper.



Alec Morton

Professor

Management Science

Impact of pandemic response upon public mental health and disparities

I had the privilege of leading a fantastic team from Strathclyde and the Mental Health Foundation (MHF) on a joint project on the population-level impact of the pandemic and the associated restrictions on the mental health of the population. It was a particular honour to be leading this project as I'm not primarily a public mental health researcher, so I feel I have learned a lot, not only acquiring new knowledge but also new perspectives and ways of looking at the world.

The project was a combined quant/ qual study with a population-level survey and interviews with people from particular vulnerable subpopulations (single parent families and people with longstanding mental and physical health conditions). The project ran over 6 months from the start of May to end October and was funded by the Chief Scientist's Office of the Scottish Government as part of their Rapid Research in Covid-19 portfolio.

Our main findings were that people in vulnerable groups are suffering more than people in the general population. What worried people most was about getting ill with the virus, being away from their friends and family, coping with uncertainty, financial concerns and accessing healthcare. Many people have found digital technologies very helpful in maintaining relationships with friends and family and also being able to access healthcare and support communities, but some people are "digitally excluded" and cannot access these technologies. A strong message which came through was that the outdoors has been very important to people in maintaining their mental health.

The biggest challenge in delivering the project was the short time-frame. Because we only had six months, the project had to be intensively project managed with little room for slippage and a clear view of how to pull all the disparate pieces together to produce the final deliverables. Fortunately the survey was being handled outside the team by YouGov and MHF had set up the survey and cleared the ethics before we got started, which reduced the complexity.

The high point of the project was undoubtedly the amazing team, who were incredibly passionate, committed, professional and resourceful. The collaboration really helped me understand and appreciate MHF's distinctive vision of how society can better protect public mental health, but also how, as a third sector organisation they go about delivering and communicating with the public (e.g. through their website "How to look after your mental health during the coronavirus outbreak").

There seemed to be quite a bit of interest in the results of the project both from Scottish Government and from media (I was even interviewed on television). At such a challenging time for everyone, the most rewarding thing was the chance to be doing something useful.

An overview of the project is available on the Scottish Government website.





Dr Samuel Mwaura

Lecturer

Hunter Centre for
Entrepreneurship

Coronavirus and the financing of ethnic minority entrepreneurship in the UK

I was greatly fortunate to have secured a pot of funding from the Royal Society of Edinburgh (RSE) in 2021. The funding, dubbed “research reboot”, was targeted at academics, especially those from a minority background like myself, whose research would have been severely impacted by the pandemic and thus needed a jumpstart. In my case, I had been experiencing some challenging personal circumstances at the time which had significantly jeopardised my research productivity. In addition, the shift to online teaching required much longer class preparation time and there were a lot more meetings, emails and other admin tasks than usual. As a migrant and single parent with co-parenting and home schooling duties and no family support locally, I had found it very difficult to find time to prioritise research during the pandemic. The RSE funding could not have come at a better time and I remain profoundly grateful for the research time the RSE enabled me to secure.

The project undertaken investigated the various steps access to bank financing by small and medium enterprises (SMEs) entails and the ways in which various variables impact the outcomes for SMEs at the various steps. In particular, we were interested in finding out if gender and ethnicity had a significant association with these outcomes. In addition, given the raft of interventions introduced by the government to support businesses rebuild amid the pandemic, the study also examined how the pandemic (interventions) had influenced enterprise financing and in particular whether there were significantly different effects for ethnic minority-led SMEs.

The main findings were that during the pandemic period, the likelihood that ethnic-minority SMEs had their loan application approved by banks increased by 32 percentage points compared to the pre-pandemic period.

White-led SMEs also saw their approval chances go up by 15 percentage points. Minority SMEs thus appear to have benefitted from the loan guarantee schemes introduced by the government to support SMEs to a significantly greater magnitude. However, this was only conditional on having actually submitted an application. Before the bank's approve or deny decision, SMEs need to have had an appetite for investment and then the confidence to approach banks for such funding. Success in these steps is selective and in fact significantly disfavours ethnic minority SMEs. Once you account for this selectivity, approval chances did still improve for ethnic minority SMEs but the improvement was significantly lower than that observed for White-led SMEs. The implication is that while the significant relaxation of loan approval criteria following government guarantee schemes during the Covid period did help minority businesses, to enhance the chances of minority SMEs in the population, and not just the crème of minority entrepreneurs that get to the last application stage, research and policy requires to understand and alleviate disadvantage from a lot earlier in the enterprise financing journey.

This was an interesting project to undertake during the pandemic in an area of interest to me both as an enterprise finance researcher and as a minority ethnic myself. The funding came through very quickly and the work needed to be completed within a short period so one challenge was that the project period overlapped with previously arranged teaching commitments. Thankfully, I was able to extend the project period to finish the work properly and my Head of Department then also allowed me to carry over some of the buyout beyond the project period to account for the overlap.

I also had a couple of encouraging highlights while undertaking the project. During one of the windows when international travel restrictions were relaxed, I had the opportunity to attend a methods summer school in Lugano, Switzerland, as part of the research reboot. Here, I not only made new international research contacts, but I received very helpful feedback on my work in progress. Besides, I learnt how to implement a highly technical methodological procedure that I had been keen on for some time. The RSE also hosted a mini conference in Edinburgh for everyone that received the research reboot award. It was hugely refreshing to meet other colleagues from elsewhere in Scotland that had had a reboot and talk about challenges we had all been dealing with and celebrate the reboot success together.



Tim Sharpe

Professor

Architecture

The Inside Story

As an architect and researcher, I have been involved in the design and evaluation of low energy/carbon buildings for many years. As we make buildings more energy efficient and airtight, ventilation becomes much more important. Within this, issues of health have always been important and more recent work has started to focus on how buildings actually perform. Given that there are well-established associations between ventilation and health this led to a number of projects evaluating ventilation in buildings, an AHRC funded network 'Health Effects of Modern Airtight Construction', involvement in a National Institute for Clinical Excellence (NICE) committee on 'Indoor Air Quality at Home', and a Royal College of Paediatrics and Child Health report on Indoor Air Quality, published on February 2020. Although at the time this seemed a niche interest, in March 2020 I got a call from Prof. Cath Noakes with whom I had worked on several of these projects. She had been tasked with setting up an Environment and Modelling (EMG) sub-group of the Governments Scientific Advisory Group for Emergencies (SAGE) which would focus on the environmental transmission of Covid. The remit covered a number of transmission routes, but included issues of airborne transmission and the role of ventilation in the built environment. This needed cross disciplinary expertise to understand the role of the built environment in the emerging pandemic.

This was the start of what would become a very long journey to understand routes of transmission, risks and mitigations. To many of us, it was very clear that the virus was to a significant degree airborne, but the challenge was evidencing this – at the beginning studies were thin on the ground, and aspects of routes of transmission were difficult to identify retrospectively, but this was seen by the group as absence of evidence, rather than evidence of absence. The need for hard evidence to inform policy decisions placed the bar high, and there was little appetite for precautionary measures. However, it also became clear that the vast majority of transmission took place indoors, so the importance of the built environment was clear. Over the course of the next 24 months the SAGE-EMG group was able to produce a range of papers to SAGE that set out the risk, but importantly the mitigations, and these were used to inform policy and guidance, being referenced by a range of industry and government organisations.

A key breakthrough was in Autumn of 2020 when the phrase 'Hands, Face, Space' had the word 'Ventilate' added. A key aspect of this work was also the public engagement. I was asked to participate in a range of media campaigns, which included both press and TV appearances, particularly prior to Christmas 2020 when there were major concerns about transmission in homes over Christmas. This communication was vital, but not without its challenges.

The work has established a number of measures and mitigations, including systems for assessing ventilation of building through the use of CO2 monitoring which has now become commonplace in a range of settings, both as means of assessing ventilation, but also raising awareness of air quality. In Autumn 2020 was I asked to chair a Scottish Government Working Group on ventilation in preparation for winter 21/22 which led to the establishment of a £25m fund for businesses, announced by the First Minister, and the UK Building Standards requirements for ventilation have been revised to require this in key settings.

There are few positive legacies of the pandemic, which is not yet over, but perhaps one is that we have become more aware of is the importance of ventilation and indoor air quality. Poor indoor air quality was a health issue before the pandemic and will continue to be a challenge long after it. I have contributed to Sir Chris Whitty's Chief Medical Officer report, due to be published this summer which focusses on the threats of air pollution and also the Royal Academy of Engineering reports on Infection Resilient Environments. Tools such as CO2 monitoring used in early research projects have become part of regulation and compliance, and input into the current building standards has led to the increasing use of monitoring of buildings to evaluate ventilation.



Dr Pratima Sambajee

Lecturer

Work, Employment and Organisation

A capabilities assessment of Covid-19 changes to the Workers' Rights Act in Mauritius: implications for domestic and migrant workers

The Covid-19 pandemic and subsequent lockdowns impacted the whole world, but it was undeniably experienced differently in less developed countries. Our team had been researching the health and well-being of migrant workers in the global south since 2018 and we knew that the vulnerabilities of these people would exacerbate in the pandemic, so it came as no surprise when the governments in those contexts started announcing deliberate measures to protect employers and axe workers' rights. In May 2020, such was the case in Mauritius where the COVID-19 Act 2020 was passed by the government. Landmark changes were made to the Workers' Rights Act 2019 which impacted both local and migrant workers. The hardest hit were workers in tourism and hospitality, textile factories and the informal economy. Examples included reduced compensation, withholding of workers' annual leave, facilitation of justified termination of workers' contracts and exemption from negotiations with workers' organisations (unions) by employers prior to reduction of the workforce.

The research team, comprising of colleagues from the Department of Work and Organisation (WEO) at the University of Strathclyde and the Department of Law at the University of Mauritius, had been in conversation with various unions on the ground and the formulation of the project was an organic process that promised to deliver key policy recommendations to the government. As the principal investigator (PI), also a citizen of Mauritius, ensuring the research was conducted in a timely manner was a major challenge given that further national lockdowns were announced during the project's timeline. We showed agility at all phases, constantly re-considering our research strategies and had to be sensitive to accessing workers who were undergoing various types of trauma in their lives. However, the most disruptive event was when the funder announced cuts in funding that could draw the project to an earlier end. This led to a moment of panic and demotivation across the research teams. I was inconsolable that we would not be able to progress and would be leaving workers behind.

But then, the University showed the greatest empathy and agreed to support the project with zero turnover as long as the research team was willing to continue within the reduced budget. It was amazing how the UK and international team pulled together to make things happen. In December 2021, we finally had enough data to show policymakers how changes to the Workers' Rights Act 2019, had impacted the quality of life of both local and migrant workers. The salient part of our findings concerned the level of deprivation and abuse workers were enduring and how employers remained at the forefront of decision-making while receiving maximum protection from the government. Another major finding was the extent to which workers had little notion of their rights and a poor understanding of the changes that were taking place. Despite being familiar with the context, I found it appalling how the State could overlook workers' cry for protection. In the end we have been able to make a list of recommendations to various stakeholders and we are still working to make the necessary impact. In general, undertaking this project was a roller-coaster but it was possible because of the strong collaboration between the research teams, the support of the University of Strathclyde and each team members drive to make a positive contribution towards the working lives of people.

Funding of £199k for our work has been supplied by the Newton Fund – Agile Response to Covid-19.

The work was done in collaboration with the University of Mauritius by the Strathclyde team: Dr Pratima Sambajee (PI) , Prof Dora Scholarios (CI), Dr Darren McGuire (CI) and Dr Najah Zatun Yusof (postdoctoral researcher).



Colin Suckling

Research Professor

Pure and Applied Chemistry

New Drugs to Treat COVID-19 and Future Viral Pandemics – The Strathclyde Minor Groove Binder Project

If humanity were unaware of its vulnerability to infectious disease, the COVID-19 pandemic shocked almost everyone out of complacency. We live in a privileged age when many diseases that scourged the past, in particular bacterial infections, have been greatly suppressed by the use of antibiotics. But the bugs fight back and rapidly become resistant. Scientifically this was recognised long ago but little was done about it. In the late 1990s, Roger Waigh, then Professor of Medicinal Chemistry at Strathclyde, and I began the Strathclyde Minor Groove Binder Project (S-MGB) with the express aim of finding drugs to treat infectious disease, including viral infections, that would be resilient to the development of resistance.

Minor groove binders are small molecules that fit into the minor groove of DNA and through this interaction disrupt simultaneously several essential biological functions of the infecting organism; the multiple disruption is the basis of the resilience to resistance. Our team, which included Professor Iain Hunter as lead microbiologist, believed that it should be possible to treat many different infections using S-MGBs because S-MGBs bind to DNA. We found that we could indeed treat bacterial, fungal, and parasitic infections with different S-MGBs. But viruses? Viruses are amongst the most difficult pathogens for drugs because they become resistant very easily. Moreover, many viruses replicate from genetic instructions in RNA, not DNA.

About 10 years ago, an opportunity to find out whether S-MGBs might work came with the help of Professor Arvind Patel (University of Glasgow). I arranged for him to investigate a representative selection of S-MGBs to challenge hepatitis C virus (HCV), which uses RNA. Remarkably, some S-MGBs suppressed viral multiplication. More interesting still, there was more than one mechanism: replication through RNA and entry into the host cells were blocked.

Then along comes COVID-19. Could S-MGBs provide a treatment? But we were locked down without normal research access! Upon learning that Sars-COV-2 virus, the RNA virus causing COVID-19, enters the host cell by attaching to a receptor on the human cell surface and remembering that Arvind had found that S-MGBs blocked viral entry into cells, from my desktop computer locked down at home, I modelled the interaction of S-MGBs with the receptor and found that it was probable that S-MGBs would bind. If S-MGBs also bound to RNA, as apparently they do in HCV, we would have multiple mechanism of action antiviral drugs amongst our S-MGBs, which should be resilient to resistance development.



Figure. An image that started the anti-COVID-19 S-MGB project. An S-MGB with antiviral activity (coloured) blocking the receptor, known as ACE-2, (grey) used by the virus.

The heavy lifting to obtain research funds was done by my Chemistry colleague, Fraser Scott, who was Principal Investigator. It was not simply a case of form-filling but required extensive negotiations with what was then Public Health England to set up the necessary experiments, the Chief Scientist's Office Scotland for the necessary funds, and the University of Strathclyde for access to the laboratories during lockdown.

Fraser made it work and results from Public Health England made it worthwhile. Excitingly we learned not only that some S-MGBs killed Sars-COV-2 but also that there was a reduction of viral load in a live animal model of COVID-19. This shows that S-MGBs can be the basis for new anti-COVID-19 drugs, but the implication is wider. The mechanism of action of S-MGBs means that they should be active not only against known viral infections including Sars-COV-2 but also against future variants and other viruses yet to spread in humans. This is clearly not the point to stop research. We're now gathering more data to establish the basis for a major research and development project.

See <https://doi.10.4155/fdd-2022-0001>

<https://www.cso.scot.nhs.uk/wp-content/uploads/COVSCL2001-1.pdf>

Health & Care Futures

The University of Strathclyde

There was most certainly no crystal ball. The worldwide pandemic did hit the University of Strathclyde as well – or as poorly – prepared as it hit the global community.

But we had already in place a research culture that embraces collaboration across traditional disciplines. Following on from past Research Exercise Framework (REF) experience, we had developed ‘Health & Care Futures’, a virtual Faculty encompassing our health and social care related work. Challenges in modern healthcare require increasingly holistic solutions: A novel type of medicine might need creative new management pathways for distribution as well as understanding of economic impacts. Data enabled care requires considering the psychology of the service user and the professionals working with it. Only in bringing disciplines together and working closely with partners in industry, the third sector and healthcare providers, can we develop visionary solutions.

We use state-of-the-art innovation and expertise in the fields of medicines innovation, health technologies, data analytics and artificial intelligence, and the workforce and leadership. Through this, we'll promote the delivery of new models of care focusing on prevention, and empowering individuals and populations to live as well as possible at home and in their communities.

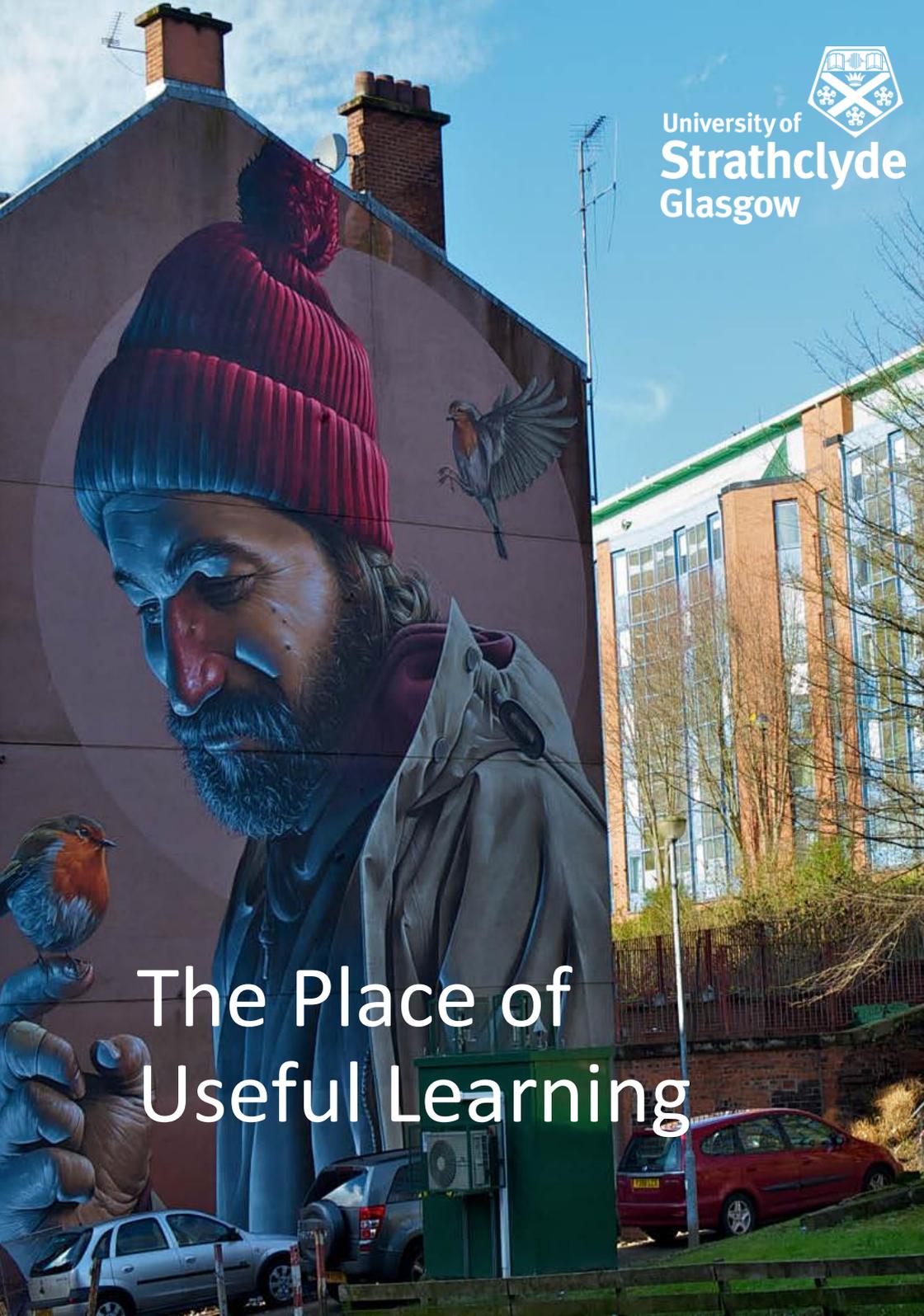
When Covid-19 emerged as a global health challenge, we were able to respond to a wide range of aspects: health economy, medicine development, health architecture and planning, medical testing and assurance, and indeed many more. Working with partners both national as well as international, we have developed novel solutions for future development.

The pandemic left scars across society and revealed weaknesses. Yet we emerge with optimism and strengthened resolve to support and develop our health and care system.





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