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Papers from the British Criminology Conference

An Online Journal by the British Society of Criminology

Volume 20, 2021



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Papers from the British Criminology Conference

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2021 Conference (7-9 July 2021), Crime and Harm: Challenges of social and global justice?
Hosted by the Open University.

Editorial Board

Lizzie Seal (Editor)

Steven Rawlings

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Editorial

Lizzie Seal

The BSC's 2021 conference was a collaboration with The Open University entitled 'Crime and Harm: Challenges of social and global justice' and took place 7-9 July. Inevitably, in 2021 things had to happen a little differently, and it was the BSC's first conference to take place online. An advantage of taking place online is the truly international scope this enabled, with participation from presenters and plenary speakers from around the world. Plenaries engaged with issues of urgent contemporary criminological relevance, such as Black Lives Matter, decolonising criminology, gendered and green harms, and harms related to policing. The submissions to the conference journal were peer-reviewed and two out of the six were accepted for publication. My thanks are due to the reviewers for providing helpful feedback on submissions and to the authors for being timely with completing requested revisions. The journal has tight deadlines and could not be produced without the willingness and co-operation of reviewers and authors.

Demsey discusses her findings on how men incarcerated in an open prison experience nature, including recollections of their experiences from closed prisons. Biophilia, gaining positive experiences from interactions with the natural environment and/or animal life, was important and a significant aspect of being in an open prison. Participants also described experiencing biophobia, negative aspects such as discomfort with the natural environment as alien, exposure to pests in cells or aggressive dogs as part of the prison regime. Li et al analyse crime data from London and Sydney in 2020 to assess the effect of imposing lockdowns on crime rates. They apply two classic criminological theories, routine activities and general strain, in order to understand how lockdowns affect crime. While crime rates dropped overall, certain crimes such as those related to domestic abuse, drugs offences and cybercrime rose. Changed patterns of mobility and increases in strain help to explain these patterns.

The 2022 conference is hosted by University of Surrey 28 June – 1 July with the title 'Reimagining Criminological Futures: New Criminologies in a Changing World'. The world has certainly changed – let's hang tight for 2022.

Lizzie Seal, University of Sussex

Biophilia and Biophobia: Diverse Experiences of Nature in Prison

Holly Dempsey

Abstract

This article focuses on the ways imprisoned men experience ‘nature’ - one of several broad terms used which allowed participants to freely associate interview questions with their own experiences. The concepts of biophilia (innate love of nature) and biophobia (innate dislike, discomfort or disregard of nature) are used to frame imprisoned interactions with and responses to nature. This approach acknowledges that relationships with nature are complex, layered and influenced by the built environment, prison regime, and individual differences. Imprisoned men, herein, had complicated relationships with nature. They were often denied access to desirable nature, whilst undesirable aspects - pests, uncomfortable temperatures, and sensory intrusions - were amplified by physical imprisonment and the design of carceral structures. Exposure to positive and negative aspects of nature may impact rehabilitation, desistance and re-entry into the community. It is, therefore, an important consideration in the exploration of both prison design and the harms of imprisonment.

Keywords: nature, imprisonment, carceral geography, wellbeing, rehabilitation

Introduction

The problems facing the English criminal justice system can seem overwhelming. The Prison Service has been repeatedly criticised for chronic overcrowding, a lack of meaningful activity, and escalating levels of self-harm, self-inflicted deaths and violence (Stephenson et al; 2021; CPT, 2020; MoJ, 2020). During the COVID-19 pandemic, prisoners have also faced near-permanent in-cell lockdowns, an additional pain in an already painful system (Suhomlinova, 2021; HMIP, 2021). Beyond these profound stressors, people in prison may

also experience chronic, severe fatigue resultant of hypervigilance against danger and overburdened attenuation due to a lack of facilities, inappropriate design and a lack of spaces for quiet contemplation (Nurse et al, 2003; Jewkes, 2018). Whilst people outside prisons may experience complex challenges, prisons also remove or restrict many ‘relievers’ relied upon to reduce stress, including cigarettes, television, socialisation and restorative spaces (Goffman, 1961:68, Brown et al, 2019).

When faced with a system in perpetual crisis, why is nature in prisons worthy of investigation? In short, because researchers have found that exposure to nature improves almost every aspect of the human lived experience. Nature can confer significant benefits for holistic wellbeing, which may be most powerful for vulnerable and marginalised groups – a category prisoners fit into because they are involuntarily confined, though many face additional challenges. Whilst time outside is recommended in the Prison Rules (1999:728.II,30), it is not mandated and relies on the beneficence of weather and maintenance of order. As such, natural spaces are often characterised as aesthetic niceties to be enjoyed when convenient rather than essential tools for wellbeing.

Prisons and Nature

Despite humanity’s origins as a nature-based species, industrialised people now spend upwards of 90% of their time indoors (Veitch, 2011). The removal of nature from people’s daily lives can result in stress, ill-health, and unhappiness. Interactions with nature have been found to reduce mental health problems, support positive emotions, and mitigate stress (WHO, 2016). Physically, they have been found to positively impact a wide range of medical conditions and improve patient experience and recovery (Sandifer et al., 2015; Ulrich, 1984). Nature has also been found to reduce aggression and violence whilst improving cognitive functioning, attention and trauma processing, encouraging social cohesion, community mindedness and pro-sociality (Nadkarni et al., 2017; Kuo and Sullivan, 2001a). Contact with nature also appears to mitigate some side-effects of urban living, providing biophysical ecosystem services by absorbing pollutants and reducing heat, flooding and noise pollution (WHO, 2017).

Whilst terms like ‘nature’ can be imprecise, the one element that binds natural experiences together is their multi-sensory quality. The peaceful engagement of multiple senses induces a state Kaplan (1995) calls ‘soft fascination’. In this peaceful, relaxed state, human attenuation, often over-stressed by city living, 24-hour news cycles, and hectic work lives, can find

meaningful recovery and restoration. Such experiences are rare in prison environments and provide insight into why nature, or the lack of it, may have relevant implications for people serving time in prison.

The evidence suggests that contact with nature is beneficial to human health. Still, it appears to have the most significant impact on those enduring hardships, such as poverty, illness or living in involuntary confinement (Hordyk et al., 2015). Many people arrive in prison with challenging ranges of personal problems (Halliday and Hewson, 2021; NAO, 2017).

Prisoners are more likely than the general public to have experienced trauma, abuse, social exclusions, homelessness, drug and alcohol dependency, and complex mental health conditions (Tomaszewska et al, 2019; Bowler et al, 2018; SEO, 2002). The emotional and behavioural consequences of such experiences are heightened by exposure to the prison institution but also its environs (Mills and Kendal, 2018). The issues people may face, both individual and institutional, are compounded by the drear and stark environment (Söderland and Newman, 2017). Anglophone¹ prisons have departed from their gothic origins and now resemble anodyne warehouses or abattoirs (Jewkes, 2018; Fiddler, 2007). An obsession with future-proofing, value-engineering and securitisation have discouraged creative thought, excluded nature and produced buildings, almost stunning in their sheer dullness (Hartman, 2015; Jewkes and Moran, 2017). When participants were asked about colour in prison, the answer was almost always ‘grey’. The colours of prisons are notoriously bland and uninspiring but have also been theorised as deliberate; “This dull colour scheme is intentional, reflecting managerial discourses on the nature of prisoners for whom the units are designed” (Shalev, 2009:117). Buildings communicate semiotically; their design sends messages about who and what a building is for (Clements-Croome, 2013). Poor quality or thoughtlessly designed prisons send the dehumanising message that they are “non-places for non-people” (Jewkes et al., 2017:293). One participant, Sam, described closed prisons as sounding:

Industrial and mechanical, it sounds like a warehouse, like a factory, it doesn’t sound like a human place, though the atmosphere is punctuated with human noise, it doesn’t sound like a human place.

¹ Anglophone meaning English speaking; used here to describe similarities in prison design across English speaking countries.

Despite the evidence suggesting people in prison might benefit from contact with nature, it is often seen as risky, costly to initiate and maintain, and an attribute that could incite anger and distaste from local communities (Moran and Turner, 2019). However, without plant life, prisons become sterile and artificial (Jewkes and Moran, 2015). In places devoid of nature, instances of it can be the subject of great interest and curiosity. King and McDermott (1990) gave geranium seeds to residents of a prison where they had carried out research. The plant's growth was observed by clusters of men who would stop by to observe the seeds' progress. The prison, however, did not recognise curiosity or an affiliation with nature, but only risk – frequently reporting and investigating prisoners who lingered too long, rendering the geranium subversive. Regarding nature as an inherently risky frivolity persists in contemporary prisons, yet it is an inherently human trait to be interested in things that grow and change (Jewkes and Moran, 2015).

During the multiple lockdowns enforced in the UK to tackle the spread of COVID-19, people have been told to go outside and connect with nature to cope with the stresses and pains of pandemic life (Briggs, 2021; McCarthy, 2020). People in prison, however, have had to endure heavy restrictions, for lengthier periods than the community, with some prisons enacting 23 hour-a-day lockdowns for significant periods (Maycock, 2021; HMIP, 2021). The large body of research around solitary confinement suggests that the costs of this approach are likely to be heavy and long-lasting (Reiter and Blair, 2015; Shalev, 2009). Severe lockdowns separate imprisoned people from each other, reduce available activities and limit a person's world to their immediate environment. Imprisonment on these terms also forcibly separates prisoners from most nature.

To explore prisoner relationships with nature, this article focuses on the concepts of biophilia and biophobia. Kellert (1993:21) describes Wilson's 1984 theory of biophilia as the "claim of a human need, fired in the crucible of evolutionary development, for deep and intimate association with the natural environment, particularly its living biota". The theory suggests that humans evolved in and from nature to such an extent that a need and preference for it became genetically encoded. It also describes an almost spiritual experience, wherein people feel meaningful connections to certain natural places or types of nature and feel positive results from spending time in them.

Contrastingly, biophobia is the perception of nature as frightening, disgusting, subservient or irrelevant (Orr, 1993). Urban living, cleaning products, barriers against nature and

environmental controls may all contribute to a discomfort with the natural world. However, Wilson (1984) suggests that our brains are primed for nature, primed for affiliations with it and primed to be improved through positive exposure to it. To speak of affiliation for nature is not to deny the existence of other affiliations but to recognise that those who live apart from nature may be unknowingly missing something vital (Orr, 1993). People in prison who are isolated from nature are cut off from the unique range of sensory information it supplies and the wellbeing benefits it conveys. Instead, prisoners are often under-exposed to positive nature – views, variable daylight, plants and benign animals. Simultaneously, they are over-exposed to its negative counterparts – prisons are often too hot during summer, too cold in winter, poorly lit, home to vermin and pests, and patrolled by guard or sniffer dogs (Sharkha et al, 2020; HMCIP, 2017; Moran, 2015). These factors can encourage discomfort with the natural world to emerge or be amplified as a result of the prison environment itself.

Methodology

In this project, thirteen men were interviewed who were residents at HMP Springhill, an open prison in rural Buckinghamshire. Whilst transport links to the prison are poor, its rural location and open status afford Springhill many natural spaces usually absent in higher security establishments, including a large exercise field, outdoor seating areas, a woodland pathway for visits and the Buddha Grove². Apart from the natural areas, Springhill is an odd mixture of rundown buildings. Like many open prisons, the site was originally a country estate, and the grand house still stands though inside it is somewhat dilapidated. A number of ‘huts’ provide rooms with shared bathrooms and kitchenettes, which were criticised in the last HMIP report but would require significant investment to improve (2018).

Category D or open prisons are very different from the closed estate. At Springhill, no walls surround the site, and residents are free to move around most of the grounds, are not confined to cells, have more access to employment and pre-release support (Marder et al, 2021). Open prisons are intended to support people who have served lengthy sentences to become accustomed to life outside prior to release. In recent times, more diverse prisoners serving shorter terms are being assigned to open prisons as well. Risk is a key consideration for open prisons, who wish to select trustworthy people who are unlikely to abscond or re-offend; these things do happen, but the intention is to minimise this risk (Statham et al, 2021). Open imprisonment remains under-researched; there are many aspects of it that may make

² A small area with a statue of Buddha and benches, set in a woodland area with views across the countryside. The space is popular but does require special permission to access it.

imprisonment easier to bear, but also unique challenges (Shammas, 2014). Whilst this paper is not intended as an analysis of open imprisonment, I hope it can elucidate the difference between the physical environments of open and closed estates and how these differences are experienced. This site was selected because residents would be able to talk about not only their time at rural Springhill but also time spent in closed facilities and how these experiences compared. I use the terms ‘open’ and ‘closed’ to clarify which part of the prison estate a participant is speaking about.

Qualitative, semi-structured interviews were utilised to provide an understanding of how the men experienced nature at Springhill and other establishments (Davies et al 2011; Bosworth, 2005). For three weeks, I spoke with people and traversed the grounds. This acquainted me with Springhill as a relative outsider who had no lived experience of living or working in a prison. The number of interviews was limited by the time available for Masters research; however, qualitative research stresses the value of individual experiences, seeking to explore these in depth rather than seeking to produce generalisable data (Lareau, 2021).

Ethical approval was granted by the University of Cambridge and the HMPPS National Research Council. Verbal consent was gained from participants before the interview, and an information sheet was provided which described the research, its purpose and participant rights. Before starting an interview, a consent form was signed once we had discussed that participants may withdraw until publication, questions could be skipped without explanation, and the interview could be ended at any time. Participants’ accounts were anonymised to protect their identities. Whilst speaking about nature may not seem the most emotive subject, discussing any aspect of imprisonment can be difficult. One participant was overcome by emotion; he felt that conditions at Springhill were much better than closed conditions, and it elicited a strong reaction, though he was happy to have the chance to talk about what coming to Springhill meant to him.

It is worth acknowledging that ‘nature’ and related terms are vague and may summon different imagery for different people depending on experiences, culture and environment (Bratman et al., 2012). Nature is often described as green but can be many colours; it can be wild or manicured, vast swathes of forest or a potted plant, immersive or vicarious. Some interview questions referred to specific aspects of nature; however, most deliberately used broad terms to allow participants to frame their answers within their understanding of what nature ‘is’.

Results and Discussion

This project explored experiences of nature more broadly, but thematic analysis revealed examples of biophilia and biophobia, which seemed to occur naturally, as a result of the environment or sometimes in spite of it.

Biophilia

Biophilia often seemed innate, allowing access to nature to become a simple joy in simultaneously complex, dull and frightening environments. Sam responded viscerally to the far-reaching views from the window of the Springhill interview room, “makes you want to live, doesn’t it, makes me want to be alive, makes you want to live, makes you happy, makes me happy anyway”. The presence of nature for Sam was, in and of itself, life-affirming. Simon found entering prison very difficult but felt fortunate to have become involved in a gardening programme early on in closed conditions:

“That time [in the garden] gave you the wherewithal to be able to cope with the bang-up , [...] without that time outside, without that time just getting your hands dirty and everything else; I hate to imagine what would have happened”.

The time outside fortified Simon against the more destructive side of imprisonment, allowing him to get out of his cell but also to escape from the thoughts and feelings that became overwhelming during long periods alone. Nature at Springhill provided opportunities to find joy in small things; Paul took advantage of this, using nature to augment his personal space; “wherever you look there’s something – at any time of day or night, there’s something to make you smile, there’s flowers out there, I actually pick a few of the daffodils, and I put them in my room”. Having plants in his room allowed Paul to integrate nature more fully into his life as a source of comfort and strength. Prisons can be incredibly stressful places to live and work (Massoglia, 2008), rarely allowing time or space for peace; in the quiet nights of Springhill, however, Mo found peaceful and restorative contemplation:

I just usually sit on the bench and look out, look at the trees, and it’s dark, most of the time I sit there it’s dark, and it’s just quiet, and it’s peaceful, and that’s one of the things I really like about this place, you know, cause, I think in nature you find comfort and I feel for people in closed conditions when they don’t have that.

Biophilia in prison was often frustrated by both the physical and disciplinary environments. The lack of physical contact with nature was felt keenly by participants who were prohibited from engaging haptically with grass, sunlight and rain in closed conditions. Indeed, on arriving at Springhill, Joel walked barefoot on the grassy field - “that just felt lovely, just having that connection to the ground felt really nice because I couldn’t remember the last time I did that”. Richard and Joel described the joy of feeling rain on their skin at Springhill; people in prison are often kept inside when it rains because ‘bad’ weather has negative connotations for staff. Richard said he had not felt the rain for eight years in higher category prisons, so he would choose to remain outside even when it was torrential.

As with the haptic elements of grass and rain, nature was often yearned for in sensory capacities. Indeed, the benefits of exposure to nature are often found through multi-sensory interactions (Heerwagen, 2009). Such interactions are often frustrated in prisons, where bland, homogenous, and ‘an-aesthetic’ design deadens the senses (Jewkes et al., 2017). Visually, closed prisons were felt to be restrictive “caverns of grey and beige” (Heerwagen, 2009:53), and a dearth of views in many closed prisons was lamented. Spaces were made to feel small and enclosed by a lack of far-reaching views, “every time you turn around and look through a window, all you saw was a brick wall” [Ralph]. Where views were available, they were often impeded by security elements, “my window had all bars and then cages over it [...], and you’re like how the fuck am I supposed to see out of this window?” [Darryl]. The presence of natural, appealing, and sweeping views at Springhill was seen as an asset that improved living conditions, despite the poor state of many housing units, “it’s the uninhibited view, you know, land space, you can see it, it makes a difference, it definitely makes a difference” [Sam]. The passage of time was also felt keenly in closed conditions; each day was described as a monotonous continuum that made participants acutely aware of their location. Shaun described his time in closed conditions as a parade of soaps that he did not seem to enjoy particularly but which provided a welcome distraction. At Springhill, however, he no longer needed to force the passage of time, “I don’t even know what’s happening in EastEnders! You know, everything’s changed, I don’t even know the times it comes on no more. Even Hollyoaks, I ain’t even watched Hollyoaks since I come here!”. Distraction was no longer needed; the environment of Springhill provided space for contemplation but also topics of conversation, areas to congregate and socialise, freedom to associate with other residents and opportunities to see friends and family in less restrictive settings.

Wilson's (1984) biophilia is not just related to flora but also a profound connection to fauna, both human and non-human. Animals can be hard to come by in prison environments; the security constraints for humans often exclude animals as well. Some prisons utilise Prison-based Animal Programmes, in which residents interact with animals – usually dogs but sometimes, horses, birds or farm animals (Furst, 2006). Such programmes are found throughout prison history, though most commonly in the US, and utilise animals for companionship, therapy and employment purposes, or some combination thereof (Strimble, 2003). Whilst many programmes report significant, positive results, they run in relatively few prisons, usually for limited periods and there are often restrictions regarding the 'type' of prisoners who are allowed to engage (Minke, 2017; Mercer et al, 2015). Permanent pets are rare and often subject to upsetting rules; one participant reported that he had a budgie, but when he was transferred to another prison, he was not permitted to take the animal, of which he had become very fond, with him.

Some of the frustrated biophilia that emerged from the data involved joyful encounters with non-domestic animals, including foxes, spiders and pheasants, enacting biophilia despite the restrictive environs of higher category prisons. Joseph described the visitations of a wild animal to a closed prison; "They used to have a massive goose there, and he used to come round and chase everyone, and yeah he'd chase everyone and try and bite you, but he died ... so that was really, really sad". Joseph's palpable sadness at the passing of the goose speaks of a connection that went beyond its outward wildness and aggression to an appreciation of the animal just as it was. The cruelty of nature can be distressing, death and its part in lifecycles are as natural as anything beautiful, but they are also reminders of our own mortality and, as such, can be rendered unsettlingly abject (Kristeva, 1941).

Biophobia

Wilson (1984) describes biophilia as a spectrum including negative reactions, forming part of the natural range of responses to nature which evolved in humans and were hypothesised to serve a largely protective function – a fear of heights or snakes would keep a person safe. Biophobia, however, is also thought to manifest in people who live apart from nature and have undergone an 'extinction of experience', whereby consideration of, comfort with, and enjoyment of the natural world fail to emerge (Soga et al., 2015). Humans live in increasingly controlled urban environments that have little in common with the natural world and which often seek to exclude nature, admitting only its most inoffensive aspects. Nadkarni et al (2017) found city-dwelling children were more afraid and uncomfortable than restored in

wilderness areas. Such research has not been replicated in prison environments, though some participants suggested similar ideas, “some of them are townies, and they prefer it in towns, they can’t get used to the countryside” [Ralph], representing innate biophobia as a distinctly urban experience. Likewise, Darryl, a lifelong Londoner, struggled with aspects of country living at Springhill; “we all worry and have to deal with the pollution of cities, especially like London, but mate, you don’t half miss that petrol smell when you’re up here smelling cow shit!”.

Darryl’s experience of biophobia came in the form of a sensory invasion; the smells of the environment were overwhelming and deeply unpleasant. Many incidents of biophobia took this form and were commonly induced by closed prison environments. Joel spoke of inadequate ventilation and unopenable windows that turned hot summer days into the stuff of nightmares (Skarha et al., 2020; Chammah, 2017). Dominic described feeling “itchy, like something’s on you” because of the number of mice, cockroaches and other pest animals that found their way into his previous cells, a common experience (Cattermole, 2019; Moran, 2015). Mo, however, was distressed by the damage done to animals by closed prison buildings, “I think the barbed wires are very oppressive, [...] loads of birds just fly into it and get caught up in it, and then they’re flapping away, and you can hear them screaming and cutting themselves up”. Even invited animals could be highly threatening:

“When you go up a restricted walkway, and there’s a dog there, and a dog here, and you’ve got to walk up through the middle, their struggling, some of their handlers are struggling to keep them on the leash. It was there to send a message.” [Rick]

The prisons utilisation of Alsatians in the closed estate made Rick reticent to attend Friday prayers; their very presence felt weaponised against him. Similarly, the remoteness of many prisons has historically been utilised as a weapon, disincentivising escape, isolating prisoners from their ‘homelands’ and making visits from friends and family difficult (McAttackney, 2014). In such cases, even the most beautiful landscape surrounding a prison might be resented as a representation of the physical distance from home. If a landscape around a prison seems sufficiently ‘alien’, it may serve to make the observer feel deeply embedded, far from home and freedom (Crewe, 2011). Inside the prison, though, landscapes were rarely inviting; “I could have gone out, but it’s a concrete jungle and do you want to be walking round in circles in a concrete jungle?” [Rick]. Several participants evoked the image of prisoners walking in circles around a closed prisons’ concrete yard; these spaces were so

uninviting and dull that many saw no point in engaging with them. Outside spaces in closed prisons that were perceived as pleasant, were often off-limits “there were areas with benches, but they’re obviously not for the inmates [...] we weren’t allowed in them sort of areas unless it was to pick up litter” [Ralph]. Such spaces epitomised sensory denial that appeared to reinforce a ‘less eligibility’ agenda, creating a sense of resentment towards spaces that were deemed ‘too good’ for people serving time.

Biophilia and biophobia are experienced in many diverse and inter-linking ways. Experiences of nature in prisons were influenced enormously by the prison environment, which often served as an impediment to biophilia whilst propagating biophobic tendencies. Whilst many of the described biophobic encounters would be unpleasant for anyone, outside people are more able to regulate their encounters with nature to ensure comfort; in prison, they were inescapable, unavoidable and unchangeable. However, whilst these concepts are often understood as oppositional, Wilson (1984) proposed biophilia as existing on a spectrum encompassing all responses to nature, including attraction, aversion, fear and delight (Kahn, 2001). To gain the benefits nature can offer, these affiliations require balance, which can easily be tipped to the negative by a lack of consideration in prison designs and regimes.

Conclusion

Some researchers have theorised that once a person lacks exposure to nature as a child, the window to foster biophilia – the ‘earth period’ - expires and biophobia becomes permanent (Hansen, 1998). However, Nadkarni et al (2017) found that showing videos of natural settings to American prisoners housed in solitary confinement increased feelings of wellbeing whilst reducing stress and aggression, which translated to an actual reduction in cell extractions. The findings discussed in this article suggest the value access to nature may provide, even within restricted environments, regardless of a person’s previous experience of nature. This study also shows a range of positive outcomes participants attributed to contact with nature, including increased wellbeing, self-worth, and comfort, as well as an appreciation for spaces which allowed for reflection, recuperation and connection to the natural world that felt absent or restricted in closed conditions.

It is important to recognise the simple presence of nature within the carceral landscape is not enough to legitimise it; using Nadkarni et al’s (2017) research to justify solitary confinement, for example, would be highly inappropriate. Despite the generally positive responses to nature at Springhill, the remote locations common to open prisons may be painful. Locations

should be balanced with good transport links and facilities for visitors to allow for continued, regular contact with friends and family, a subject which should be considered in future research. The type of nature, ease of access and outcomes desired are all key. Even if these factors are appropriately considered, the presence of nature is not in and of itself curative, and the complexities of carceral relationships with nature deserves further attention. The question remains of how to introduce positive, accessible nature to prison landscapes while minimising negative experiences, as well as exploring how these complex relationships may help or hinder (p)rehabilitation, desistance and re-entry into the community.

References

Bosworth, M., Campbell, D., Demby, B., Ferranti, SM. and Santos, M. (2005) 'Doing Prison Research: Views from Inside', *Qualitative Inquiry*, 11:2, pp.249-264

Bowler, N., Phillips, C. and Rees, P. (2018) 'The Association Between Imported Factors and Prisoners' Mental Health: Implications for Adaptation and Intervention', *International Journal of Law and Psychiatry*, 57, pp.61-66

Bratman, G., Hamilton, J. & Daily, G. (2012) 'The Impacts of Nature Experience on Human Cognitive Function and Mental Health', *Annals of the New York Academy of Sciences*, 1249, pp.118-136

Briggs, H. (2021) 'Nature 'More Important Than Ever During Lockdown'', BBC, April 26th, Available at: <https://www.bbc.co.uk/news/science-environment-56889322> (Accessed:20.05.21)

Brown, A., Sweeting, H., Logan, G., Demou, E. and Hunt, K. (2019) 'Prison Staff and Prisoner Views on a Prison Smoking Ban: Evidence from the Tobacco in Prisons Study', *Nicotine & Tobacco Research*, 21:8, pp.1027-1035

Cattermole, C. (2019) *Prison: A Survival Guide*, Ebury Press: London

Chammah, M. (2017) "'Cooking Them to Death": The Lethal Toll of Hot Prisons', *The Marshall Project*, November 10th, Available at: <https://www.themarshallproject.org/2017/10/11/cooking-them-to-death-the-lethal-toll-of-hot-prisons> (Accessed:10.03.19)

Clements-Croome, D. (2013) 'Why Does the Environment Matter?', in: Ong, B. (Ed.) *Beyond Environmental Comfort*, Routledge: Abingdon and New York, NY

CPT (2020) 'Report to the United Kingdom Government on the Visit to the United Kingdom Carried out by the European Committee for the Prevention of Torture and Inhuman or Degrading Treatment or Punishment (CPT) from 13 to 23 May 2019', CPT, CPT/Inf (2020) 18, Available at: <https://hudoc.cpt.coe.int/eng?i=p-gbr-20190513-en-1> (Accessed:04.12.21)

Crewe, B. (2011) 'Depth, Weight, Tightness: Revisiting the Pains of Imprisonment', *Punishment & Society*, 13:5, pp.509-529

Davies, P., Francis, P. & Jupp, V. (2011) *Doing Criminological Research*, Sage: Singapore, London, New Delhi & Thousand Oaks CA

Fiddler, M. (2007) 'Projecting the Prison: The Depiction of the Uncanny in The Shawshank Redemption', *Crime Media Culture*, 3:2, pp.192-206

Furst, G. (2006) 'Prison-Based Animal Programs: A National Survey', *The Prison Journal*, 86:4, pp.407-430

Goffman, E. (1961) *Asylums: Essays on the Social Situation of Mental Patients and Other Inmates*, Anchor Books: New York NY

Halliday, M. and Hewson, A. (2021) *Bromley Briefings Prison Factfile Winter 2021*, Prison Reform Trust: London, Available at: <http://www.prisonreformtrust.org.uk/Portals/0/Documents/Bromley%20Briefings/Winter%202021%20Factfile%20final.pdf> (Accessed:02.09.21)

Hansen, L. (1998) 'Where We Play and Who We Are', *Illinois Parks and Recreation*, 29:2, pp.22-25

Hartman, K. (2014) 'Searching for the Beautiful Prison', *Studies in Law, Politics, and Society – Special Issue: The Beautiful Prison*, 64, pp.11-17

Heerwagen, J. (2009) 'Biophilia, Health and Well-Being', In Campbell, L. & Wiesen, A. (Eds.) *Restorative Commons: Creating Health and Well-Being Through Urban Landscapes*, USDA Forest Service: Newton Square PA, pp.39-57

Her Majesty's Chief Inspector of Prisons (HMCIP) (2017) 'Life in Prison: Living Conditions', *HMCIP Findings Paper*, Available at: <https://www.justiceinspectorates.gov.uk/hmiprisons/wp-content/uploads/sites/4/2017/10/Findings-paper-Living-conditions-FINAL-.pdf> (Accessed:13.01.19)

HM Inspectorate of Prisons [HMIP] (2021) *What Happens to Prisoners in a Pandemic: A Thematic Review*, HMIP: London, Available at: <http://www.justiceinspectorates.gov.uk/hmiprisons/> (Accessed:14.05.21)

HM Inspectorate of Prisons [HMIP] (2018) *Report on an Unannounced Inspection of HMP Spring Hill by HM Chief Inspector of Prisons: 4-15 December 2017*, HMIP: London, Available at: <https://www.justiceinspectorates.gov.uk/hmiprisons/wp-content/uploads/sites/4/2018/04/Spring-Hill-Web-2017.pdf> (Accessed:01.12.21)

Hordyk, S., Hanley, J. & Richard, É. (2015) "'Nature is There; it's Free": Urban Greenspace and the Social Determinants of Health in Immigrant Families', *Health & Place*, 34, pp.74-82

Jewkes, Y. (2018) 'Just Design: Healthy Prisons and the Architecture of Hope', *Australian & New Zealand Journal of Criminology*, 51:3, pp.319-338

Jewkes, Y. & Moran, D. (2017) 'Prison Architecture and Design: Perspectives from Criminology and Carceral Geography', in Liebling, A., Maruna, S. & McAra, L. (Eds.) *Oxford Handbook of Criminology*, Oxford University Press: Oxford, pp.541-561

- Jewkes, Y. and Moran, D. (2015) 'The Paradox of the 'Green' Prison: Sustaining the Environment or Sustaining the Penal Complex?', *Theoretical Criminology*, 19:4, pp.451-469
- Jewkes, Y., Slee, E. & Moran, D. (2017) 'The Visual Retreat of the Prison: Non-places for Non-people', In Brown, M. & Carrabine, E., (Eds.) *Routledge International Handbook of Visual Criminology*, Routledge: Abingdon & New York NY, pp.293-304
- Kahn, P. (2001) *The Human Relationship with Nature: Development and Culture*, MIT Press: Cambridge MA & London
- Kaplan, S. (1995) 'The Restorative Benefits of Nature: Toward an Integrative Framework', *Journal of Environmental Psychology*, 15, pp.169-182
- Kellert, S. (1993) 'Introduction', In Kellert, S. & Wilson, E. (Eds) *The Biophilia Hypothesis*, Shearwater Books: Washington DC, Covelo CA, pp.20-27
- King, R. & McDermott, K. (1990) "'My Geranium is Subversive': Some Notes on the Management of Trouble in Prisons", *The British Journal of Sociology*, 41(4), pp.445-471
- Kristeva, J. (1941) *Powers of Horror: An Essay on Abjection*, Columbia University Press: New York
- Kuo, F. & Sullivan, W. (2001a) 'Environment and Crime in the Inner City: Does Vegetation Reduce Crime?', *Environment and Behavior*, 33:3, pp.343-367
- Lareau, A. (2021) *Listening to People: A Practical Guide to Interviewing, Participant Observation, Data Analysis, and Writing It All Up*, The University of Chicago Press: London and Chicago IL
- Marder, I., Lapouge, M., Garrihy, J. and Brandon, A. (2021) 'Empirical Research on the Impact and Experience of Open Prisons: State of the Field and Future Directions', *Prison Service Journal*, 256, pp.3-9
- Massoglia M. (2008) 'Incarceration as Exposure: The Prison, Infectious Disease, and Other Stress-Related Illnesses', *Journal of Health Society and Behaviour*, 49:1, pp.56-71
- Maycock, M. (2021) "'Covid-19 has Caused a Dramatic Change to Prison Life'. Analysing the Impacts of the Covid-19 Pandemic on the Pains of Imprisonment in the Scottish Prison Estate', *The British Journal of Criminology*, pp.1-16
- McAtackney, L. (2014) *An Archaeology of the Troubles: The Dark Heritage of Long Kesh/Maze Prison*, Oxford University Press: Oxford
- McCarthy, M. (2020) 'Nature Got Us Through Lockdown. Here's How It Can Get Us Through the Next One', *The Guardian*, October 3rd, Available at: <https://www.theguardian.com/books/2020/oct/03/nature-got-us-through-lockdown-heres-how-it-can-get-us-through-the-next-one> (Accessed:21.10.20)
- Mercer, J., Gibson, K. and Clayton, D. (2015) 'The Therapeutic Potential of a Prison-Based Animal Programme in the UK', *Journal of Forensic Practice*, 17:1, pp.43-54

Mills, A. and Kendall, K. (2018) 'Care Versus Custody: Challenges in the Provision of Prison Mental Health Care', in Mills, A. and Kendall, K. (Eds.) *Mental Health in Prisons: Critical Perspectives on Treatment and Confinement*, Palgrave Macmillan: Cham, pp.105-130

Ministry of Justice (2020) *Safety in Custody Statistics Quarterly Update to June 2020*, London: Ministry of Justice

Minke, L. (2017) 'Normalization, Social Bonding, and Emotional Support — A Dog's Effect within a Prison Workshop for Women', *Anthrozoös*, 30:3, pp.387-395

Moran, D. (2015) 'Budgie Smuggling or Doing Bird? Human-Animal Interactions in Carceral Space: Prison(er) Animals as Object and Subject', *Social & Cultural Geography*, 16:6, pp.634-653

Moran, D. and Turner, J. (2019) 'Turning Over a New Leaf: The Health-Enabling Capacities of Nature Contact in Prison', *Social Science & Medicine*, 231, pp.62-69

Nadkarni, N., Hasbach, P., Thys, T., Crockett, E. and Schnacker, L. (2017) 'Impacts of Nature Imagery on People in Severely Nature-Deprived Environments', *Frontiers in Ecology and the Environment*, 15:7, pp.395-403

National Audit Office [NAO] (2017) *Mental Health in Prisons*, National Audit Office, Available at: <https://www.nao.org.uk/wp-content/uploads/2017/06/Mental-health-in-prisons.pdf> (Accessed:25.06.19)

Nurse, J., Woodcock, P. and Ormsby, J. (2003) 'Influence of Environmental Factors on Mental Health Within Prisons: Focus Group Study', *British Medical Journal*, 327:480

Orr, D. (1993) 'Love It or Lose It: The Coming Biophilia Revolution', In Kellert, S. & Wilson, E. (Eds) *The Biophilia Hypothesis*, Shearwater Books: Washington DC, Covelo CA pp.415-440

The Prison Rules (1999) No.728 Part II – Physical Welfare and Work Rule 30
<http://www.legislation.gov.uk/ukxi/1999/728/article/30/made>

Reiter, K. and Blair, T. (2015) 'Punishing Mental Illness: Trans-institutionalization and Solitary Confinement in the United States' in Reiter, K. and Koenig, A. (Eds.) *Extreme Punishment: Comparative Studies in Detention, Incarceration and Solitary Confinement*, Palgrave Macmillan: London, pp.177-196

Sandifer, P., Sutton-Grier, A. & Ward, B. (2015) 'Exploring Connections Among Nature, Biodiversity, Ecosystems and Human Health and Well-Being: Opportunities to Enhance Health and Biodiversity Conservation', *Ecosystem Services*, 12, pp.1-15

Shalev, S. (2009) *Supermax: Controlling Risk Through Solitary Confinement*, Sharon Shalev Milan Publishing: Cullompton, Portland OR

Shammas, V. (2014) 'The Pains of Freedom: Assessing the Ambiguity of Scandinavian Penal Exceptionalism on Norway's Prison Island', *Punishment & Society*, 16:1, pp.104-123

- Skarhar, J., Peterson, M., Rich, J. and Dosa, D. (2020) 'An Overlooked Crisis: Extreme Temperature Exposures in Incarceration', *American Journal of Public Health*, 110:Suppl 1, pp.41-42
- Social Exclusion Unit [SEO] (2002) *Reducing Re-Offending by Ex-Prisoners*, Social Exclusion Unit: London
- Söderland, J. & Newman, P. (2017) 'Improving Mental Health in Prisons Through Biophilic Design', *The Prison Journal*, 97:6, pp.750-772
- Soga, M., Yamaura, Y. & Aikoh, T. (2015) 'Reducing the Extinction of Experience: Association Between Urban Form and Recreational Use of Public Greenspace', *Landscape & Urban Planning*, 143, pp.69-75
- Statham, B., Winder, B. and Micklethwaite, D. (2021) 'Success Within a UK Open Prison and Surviving the 'Pains of Freedom'', *Psychology, Crime & Law*, 27:8, pp.729-750
- Stephenson, T., Leaman, J. O'Moore, É, Tran, A. and Plugge, E. (2021) 'Time Out of Cell and Time in Purposeful Activity and Adverse Mental Health Outcomes Amongst People in Prison: A Literature Review", *International Journal of Prisoner Health*, 17:1, pp.54-68
- Strimble, E. (2003) 'A History of Prison Inmate-Animal Interaction Programs', *American Behavioural Scientist*, 47:1, pp.70-78
- Suhomlinova, O., Ayres, T. C., Tonkin, M. J., O'Reilly, M., Wertans, E. and O'Shea, S. C. (2021) 'Locked up While Locked Down: Prisoners' Experiences of the COVID-19 Pandemic', *The British Journal of Criminology*, azab060
- Tomaszewska, M., Baker, N., Isaksen, M., and Scowcroft, E. (2019) *Unlocking the Evidence: Understanding Suicide in Prisons*, Samaritans: Ewell, Available at: [https://media.samaritans.org/documents/Samaritans_PrisonsDataReport_2019_Final.pdf\(Accessed:01.12.2021\)](https://media.samaritans.org/documents/Samaritans_PrisonsDataReport_2019_Final.pdf(Accessed:01.12.2021))
- Ulrich, R. (1984) 'View Through a Window May Influence Recovery from Surgery', *Science*, 224:4647, pp.420-421
- Veitch, J. (2011) 'Workplace Design Contributions to Mental Health and Well-being', *Healthcare Papers*, 11, pp.38-46
- Wilson, E. (1984) *Biophilia*, Harvard University Press: London, Cambridge MA
- World Health Organization [WHO] (2016) *Urban Green Spaces and Health: A Review of Evidence*, World Health Organisation, Regional Office for Europe: Copenhagen, Available at: http://www.euro.who.int/_data/assets/pdf_file/0005/321971/Urban-green-spaces-and-health-review-evidence.pdf?ua=1 (Accessed:25.06.19)
- World Health Organization [WHO] (2017) *Urban Green Spaces: A Brief for Action*, World Health Organisation Regional Office for Europe: Copenhagen, Available at: http://www.euro.who.int/_data/assets/pdf_file/0010/342289/Urban-Green-Spaces_EN_WHO_web3.pdf?ua=1 (Accessed:25.06.19)

Holly Dempsey returned to studying as a mature student, completing an undergraduate degree in *Criminology and Criminal Psychology* at The University of Greenwich, and a Masters in *Criminological Research* at The University of Cambridge, before starting a PhD at The University of Bath, where she continues to explore relationships with nature in prisons.

Frozen Cities, Frozen Crimes? Crimes changes against mobility changes following lockdowns: case studies of London and Sydney

Yijing Li, Yan Zhang and Yuying Wu

Abstract

Governments around the world have deployed social distancing and lockdowns to restrict citizens' movement to help contain the COVID-19 pandemic. A large body of evidence has emerged, showing that such dramatic changes in people's daily mobility have triggered similarly changes in criminality and delinquency at both city and community levels. Drawing on crime data of London and Sydney in 2020, this study attempts the first one-year "look back" on the impact of massive lockdowns on crime trends with the assistance of two classic criminological theories, routine activity and general strain; and cutting-edge machine learning techniques on relating the community-level geodemographics and socio-economic profiles to crime changes. The research findings suggest a general crime reduction upon mobility change during lockdowns, but some prominent crime types experienced eye-catching increases during the period featured by city; the data-driven evidence could be further utilised for crime prediction and prevention strategies throughout post-pandemic recovery.

Keywords: crime patterns, lockdown, routine activity, general strain, mobility change

Introduction

Since its outbreak, the COVID-19 pandemic has been wreaking havoc on human wellbeing, government administration, economics, crime, and social interactions all over the world, making an irreversible impact throughout 2020 and will continue to do so into the foreseeable future (Clemens, 2020; Liu et al., 2021; Stickle and Felson, 2020). In response to the pandemic - and to contain the rapid spread of the virus - governments around the world began to impose several non-pharmaceutical interventions (NPI), i.e., lockdown, social distancing,

and stay-at-home mechanisms to demobilise people's activities. The nature of these dramatic changes to mobility simultaneously affects the daily routines and the social interactions of millions of people, hereafter defining the calendar year 2020 as the largest experiment of criminological changes in human history (Liu et al., 2021; Stickle and Felson, 2020). This is evidenced by: the decrease in residential burglary and theft due to guardianship strengthened by stay-at-home directives (Ashby, 2020; Campedelli et al., 2020; Halford et al., 2020); the substantial decline in violent crimes against persons immediately following the COVID-19 containment measures (Abrams, 2021; Langton et al., 2021; Payne et al., 2020); the exceptional surge of domestic violence after the deployment of lockdowns (Dai et al., 2021; Mohler et al., 2020; Boserup et al., 2020; Krishnakumar and Verma, 2021; Piquero et al., 2020, 2021; Zhang, 2020); the significant increase of illegal drug abuse during the COVID-19 lockdowns (Balmori de la Miyar et al., 2020; Rashid, 2021; Niles et al., 2021; Zaami et al., 2020); and the increase in reports of cyber victimisation during the lockdowns with internet as the main sources for social interactions among millions of people (Chang et al., 2021; Buil-Gil et al., 2020; Buil-Gil and Zeng, 2021).

Drawing on crime data from two international metropolises, London and Sydney, this article explores how the widespread lockdowns have impacted major types of crime and which areas were the main hotspot regions, to advance our understanding of the unprecedented crime situations imposed by COVID-19. Most of the research we can find only focuses on one city or one country (e.g. Hodgkinson and Andresen, 2020; McCarthy et al., 2021; Rashid, 2021); or most studies have only observed crime trends over a short period, ranging from several weeks (see, e.g. Balmori de la Miyar et al., 2020; Felson et al., 2020; Kim and Phillips, 2021), to three months (see, e.g. McCarthy et al., 2021; Mohler et al., 2020), up to a maximum of six months (see, e.g. Langton et al., 2021; Nivette et al., 2021; Rashid, 2021).

This study aims to contribute to the field in three different aspects:

- 1) to deliver more comparative insights and solid evidence to the existing literature, by observing crime patterns in two cities, over a one-year period;
- 2) to apply classic criminological theories - routine activity and general strain - onto different cities, to identify whether some urban areas have been disproportionately affected by mobility change during lockdowns;
- 3) to explore how the trends and patterns in urban crimes will develop in the future, assisted by machine learning techniques and spatial predictive models. And, as a result, to provide references for efficient crime prevention and policing strategies.

Background: COVID-19 - the largest criminological experiment in human history

The magnitude of the COVID-19 pandemic has manifested in the dramatic changes of social orders and controls, making it the largest criminological experiment in human history (Liu et al., 2021; Stickle and Felson, 2020). During the pandemic, a variety of evidence began to emerge to indicate dramatic changes in crime, the clearest manifestations of which are in property crime. With the introduction of COVID-19 containment measures, people have had to stay at home. This has strengthened guardianship over personal property and space, resulting in a significant decrease in residential burglary and theft (Ashby, 2020; Campedelli et al., 2020; Halford et al., 2020). Whereas, for violent crimes and crimes against persons, most researchers (Abrams, 2021; Langton et al., 2021; Payne et al., 2020) have found a substantial level of decline immediately following COVID-19 containment measures, except for domestic violence. Calls-for-service (Dai et al., 2021; Mohler et al., 2020) and reported cases (Boserup et al., 2020; Krishnakumar and Verma, 2021; Piquero et al., 2020, 2021; Zhang, 2020) of domestic violence both surged upon the deployment of lockdown measures.

In addition to conventional crimes, the COVID-19 pandemic has also given rise to other types of crime and delinquencies. For example, drug-lords in Mexico City still maintained active businesses despite the stay-at-home order (Balmori de la Miyar et al., 2020); the total number of arrests for illegal drug trafficking in Dhaka, Bangladesh, steeply increased by 75% (Rashid, 2021); in parallel to these specific examples, illegal drug abuse significantly increased during the COVID-19 outbreak (Niles et al., 2021; Zaami et al., 2020). Hate crimes towards different ethnicities or religions skyrocketed during the lockdowns as well: for example, during the research period, Chinese and other Asian Americans have suffered discrimination and hate crimes due to social stigmas such as the fear of the virus, mask culture, and political ideology (Gover et al., 2020; Xu et al., 2021). Meanwhile, as the internet has become a primary source of social interaction during lockdown, reports of cyber victimisation (e.g., online romance fraud) have experienced an eye-catching increase (Buil-Gil et al., 2020; Buil-Gil and Zeng, 2021).

Literature: Explanations from classic criminological theory for lockdowns' impact on crimes

With the hope of containing the outbreak of the contagion, governments around the world have deployed NPI strategies of social distancing and mandatory lockdowns to restrict citizens' activities during the ongoing pandemic, including stay-at-home orders, social distancing, contact tracing, and border closures. The changing organisation of individuals'

routine activities (Cohen and Felson, 1979) is best situated to account for inclinations, patterns, distributions, and trends in criminal activities amid lockdowns. Meanwhile, the intensified social isolation, the worsening financial conditions, and the uncertainty and anxiety caused by a lockdown can impose general strain (Agnew, 1992) on people, which may lead them to commit a crime. A combination of routine activity theory and general strain theory seems to be a useful theoretical integration for understanding crime changes in the context of a pandemic.

Cohen and Felson's (1979) routine activity theory (RAT) sets up a key foundation to the situation and opportunity perspective that facilitates criminal acts, when there is a temporal-spatial convergence of a motivated offender with a suitable target, in the absence of a capable guardian (Cohen and Felson, 1979). RAT, as one of the most prominent criminological explanations for crime and risk of victimisation, focuses on how a situation or social context influences people's vulnerability to crime (Dugan and Apel, 2005; Xu, 2009). For example, Hayes (2018) applied RAT to understand domestic violence and found that, with the presence of the victim's friends/family as guardians, re-victimisation was reduced by 60%. Conversely, by applying RAT in the absence of guardians to the growth of domestic violence cases during the pandemic (Boman and Gallupe, 2020; Mohler et al., 2020; Piquero et al., 2021) it could be hypothesised that stay-at-home measures have extended the periods of contact between the most vulnerable victims and potential motivated abusers.

Beyond the three igniting factors of RAT, general strain theory (GST) explains that people engage in criminal behaviours because they undergo certain strains or stressors (Agnew, 1992, 2002, 2010, 2015), which, in turn, necessitates criminal conduct as one of those individuals' coping strategies to alleviate or escape from strains and relieve negative emotions (Agnew, 2002; Broidy, 2001). Strains are most likely to become criminogenic for people when there are a high-level of constraints to non-delinquent coping mechanisms like exercise or negotiation (Agnew, 2010), but the constraints to delinquent coping strategies are low (Agnew & White, 1992). Agnew (1992) specifically identifies three sources of strain that produce criminal or delinquent conducts: (1) the failure to achieve positively valued goals, which frustrate people who may end up adopting inappropriate approaches to achieve those goals (e.g. robbing to get money); (2) the removal of positively valued stimuli, which may be manifested as a breakup in a romantic relationship; and (3) the presentation of negative stimuli, such as physical abuse of parents or emotional sufferings from an unexpected incident.

The COVID-19 pandemic could be regarded as a historic disaster in human history, triggering structural changes to routine activity patterns, such as fewer motivated offenders, targets who have already evacuated, and an increase in capable guardians, inducing to a decline of criminal activity in those hardest hit regions by disasters (Leitner et al., 2011). The rollout of massive containment measures has changed people's routine activities dramatically. As a result, both people's movement and time spent in public areas have dramatically decreased, whilst time spent in residential areas has increased. As a result, crime rates have plummeted. On the other hand, similar as other disasters, the pandemic also provide an overwhelming source of strain as people have to cope with traumatic reactions to it, the loss of material possessions and valued family memorabilia, and financial pressure due to soaring unemployment (Frailing and Harper, 2017; Zahran et al., 2009).

Robertson et al.'s (2010) research found that greater exposure to Hurricane Katrina resulted in serious delinquency in adolescent girls, alongside maladaptive coping strategies such as escapist substance use. Once again, the COVID-19 pandemic is another such disaster; extensive lockdowns significantly boosted the number of unemployed people, as well as the number of unemployment benefit claims (Goolsbee and Syverson, 2021; Lemieux et al., 2020). For example, throughout March of 2020, Australia witnessed a 7.5% decrease in the job market and an 8.2% reduction in payments to employees (Australian Bureau of Statistics, 2020). The impact of financial stress due to unemployment and inequality can be substantial, as violence and property crimes are found concentrated in socio-economically disadvantaged regions (Hipp and Yates, 2011; Hooghe et al., 2011; Hulme et al., 2019; Payne et al., 2020). Beyond the financial impact of lockdowns, the constrained freedom of movement is also likely to be compounded by a range of negative psychological impacts. Young people have suffered greatly with loneliness during the pandemic because they would usually engage in gregarious social activity in their normal lives (Bu et al., 2020). It is predicted that the pandemic led to an increase in suicides of about 9570, which can also be associated with the rising worldwide unemployment rate due to the pandemic (Kawohl and Nordt, 2020).

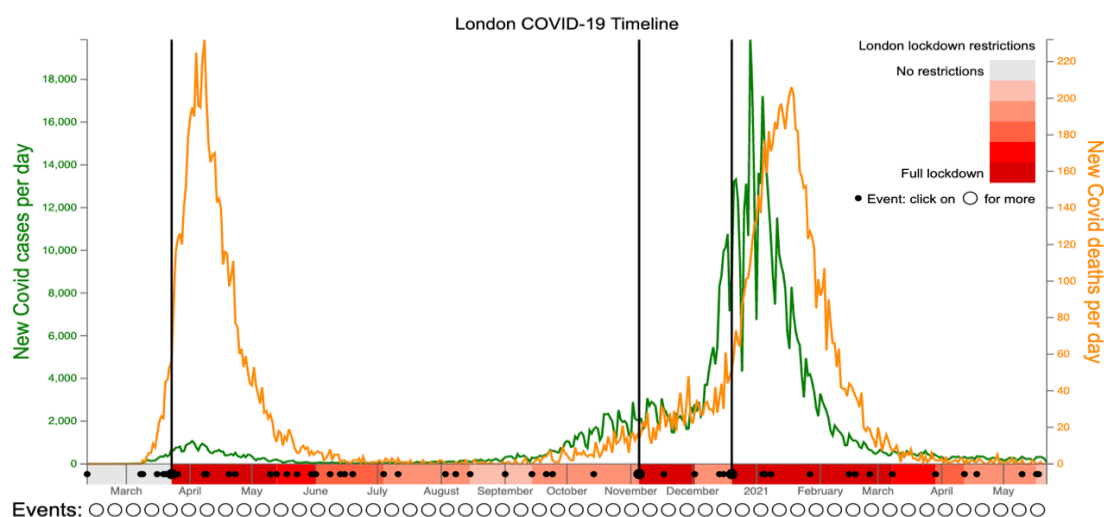
A survey of 2567 police officers across five European countries shows that risk of infection and deficient communication emerged as main stressors for police officers who are playing a crucial role in the effort to contain the virus, maintain public order, and promote safer communities (Frenkel et al., 2021). According to the general strain theory, if these negative emotions are left unchecked, commission of crimes may be the ultimate coping strategy (Agnew, 1992). In line with GST, we can understand why drug abuse/possession has become

more prevalent during the pandemic, as stress change, intaking illicit drugs to make the strained person feel better, and loneliness and depression can all be triggers for a delinquent coping mechanism (Niles et al., 2021). Meanwhile, the stress and anxiety caused by coronavirus and lockdown orders may lead to escalating anger and potential violence in the home (Piquero et al., 2021). Viewing these potential outcomes in tandem, we can see how the risk of domestic violence may have been magnified further in conjunction with the abuse of alcohol and drugs during the isolation periods (Piquero et al., 2020).

Research Design and Data

Lockdown Timelines

To reduce the transmission rates and impacts of COVID-19 in target cities in 2020, several non-pharmaceutical intervention (NPI) strategies had been set in place in line with respective national public health policies and guidelines. Examples of NPIs include, most prevalently, the national lockdowns. Haug et al. (2020) assessed the effectiveness of lockdowns depending on cities' local context, with an emphasis on the corresponding impacts on local mobility. Halford et al. (2020) further theorised that such mobility changes were the primary causes to crime rate changes in UK cities during the pandemic. In view of these insights, this study will take the lockdown milestone events as the temporal benchmarks to compare mobility and crime changes. The COVID-19 lockdown timelines in London and Sydney are depicted in Fig.1, demonstrating the first lockdown from late March until mid-to-late May 2020, and the second lockdown in November and December 2020.



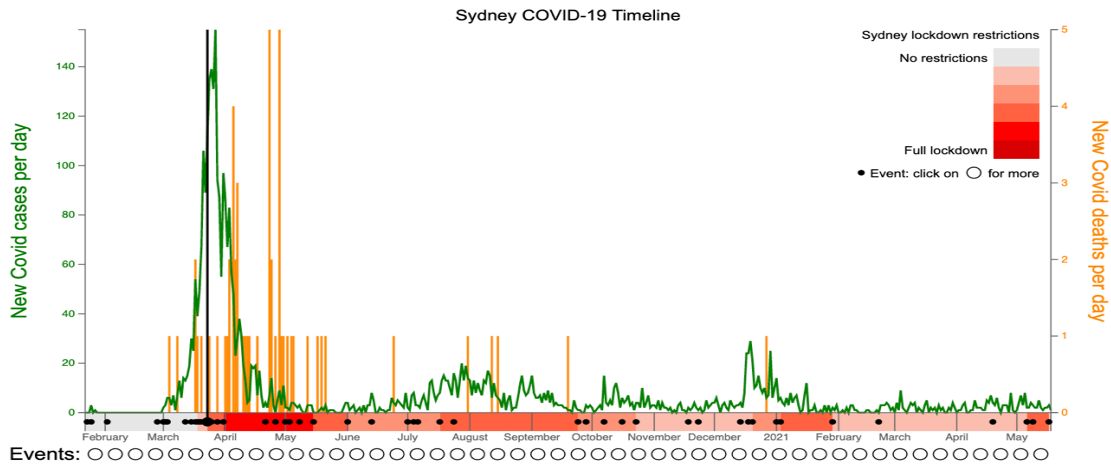


Fig. 1 COVID-19 Lockdowns in London and Sydney (Interactive details can be found via the project website at https://comparecitycrime.com/london/london_timeline.html; https://comparecitycrime.com/sydney/sydney_timeline.html)

Research design

Considering RAT and GST theories, this study utilises city-wide land use functioning data derived from Open Street Map on six land use categories - recreation, grocery, work, transit, residential and parks - this data is used to calculate both monthly and daily average mobility change in space (see detailed animation visualised on the project website <http://www.comparecitycome.com>) further relating to inner-city crime changes, either on monthly or daily basis basis (Equation 1).

$$Mob_{ik} = \sum_{j=1}^6 Mob_{jk} * (\frac{Area_{ij}}{Area_i}) \quad \dots \quad (1)$$

where i is the index for fine geographical unit (i.e., $i=1,2,3, \dots, 4835$ LSOA in London, $i=1,2,3, \dots, 312$ SA2 in Sydney), j is the land use category ($j=1,2,3,4,5,6$), and k is the index for consecutive dates (15th February 2020 - 31st December 2020) or months (February to December 2020).

The comparative studies to identify the correlation between these mobility change and crime change maps, in the context of each city, incorporated: (1) time series analyses on both crime rate change and mobility change in each city, at the finest available scale, alongside inter-city comparisons; (2) exploratory data analysis within each city, to locate the most significantly affected crime type during featured periods; and (3) spatial regression analysis considering spatial influence monthly across target cities, to address the starting question.

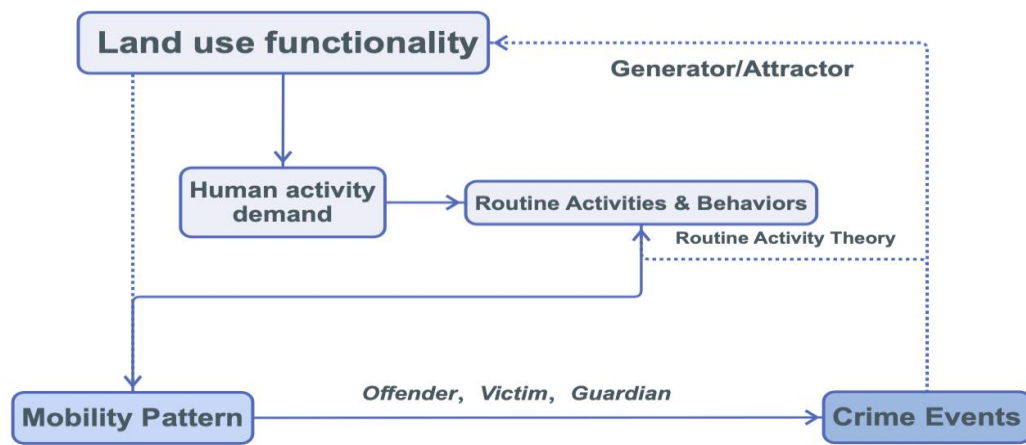


Fig. 2 Research Design Framework

Data Sources and Methodologies

To realise the research design, the mobility change data at inter-city level was collected through Apple Mobility Data (<https://covid19.apple.com/mobility>). This data reflects Apple users' map service requests through 3 means: by driving, by taking public transport and by walking, measuring its relative volume change against the baseline volume dated on 13th January 2020. The inner-city level mobility data was collected from Google Mobility Reports, upon aggregating locational data shared by users of Android smartphones onto London boroughs. This data was used to compare the time and duration of visits to the six categorised place types (retail and recreation, groceries and pharmacies, parks, residential, workplaces and transit stations) to the baseline day before social distancing measures were introduced.

Crime data in target cities was compiled from respective official statistics (London from https://data.london.gov.uk/dataset/recorded_crime_summary, and Sydney from https://www.bocsar.nsw.gov.au/Pages/bocsar_datasets/Datasets.aspx), dated from January 2008 to December 2020 consecutively at monthly intervals. This data was also aggregated by year for time-series trend comparison among them. Detailed individual crime incidents data for 2019 and 2020 was also collected and aggregated to corresponding geographical units at either monthly or daily frequency.

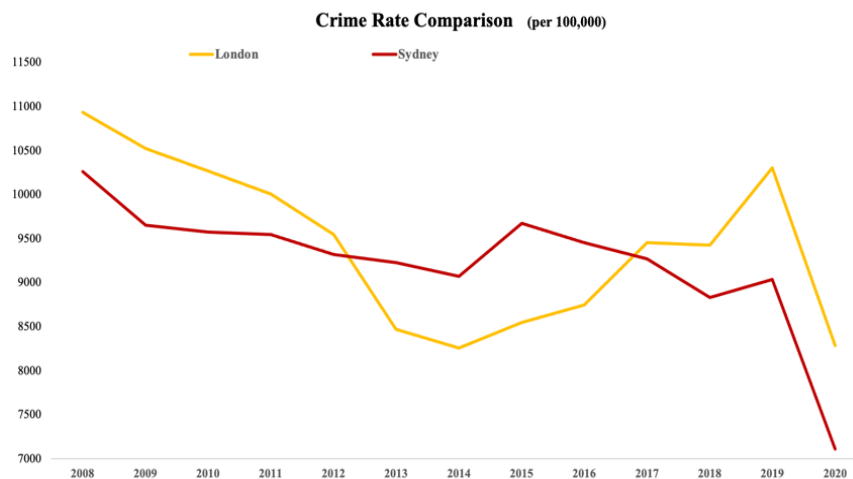


Fig. 3 Annual Crime Rate Comparison in London and Sydney (2008-2020)

Fig.3 visualises the trajectory of crime rates (cases per 100,000 residents) in each target city from 2008 to 2020. A consistent decrease in crime rate can be seen from 2008 to 2014 for both cities, followed by diverted strands from 2015 onwards. Taking 2020, as the focused time point for this study, both London and Sydney experienced significant drops in crime rate compared to 2019 during the national pandemic incurred changes. In acknowledgement of the different crime classifications between the two cities, major crime types will be analysed in this study, as listed in Table 1.

Table 1 Crime Classifications in Target Cities

City	Crime Categories and Types
London	- Property Crimes: Burglary, Robbery, Theft, Vehicle Offences - Violent Crimes: Arson and Criminal Damage, Miscellaneous Crimes Against Society, Possession of Weapons, Public Order Offences, Sexual Offences, Violence Against the Person - Drug Offences
Sydney	- Property Crimes: Betting and gaming offences, Blackmail and extortion, Robbery, Theft - Violent Crimes: Abduction and kidnapping, Against justice procedures, Arson, Assault, Disorderly conduct, Homicide, Intimidation, stalking and harassment, Prohibited and regulated weapons, Sexual offences, Other offences against the person - Drug offences - Other offences

Alongside the data, the socio-economic status (SES) data for each city was derived from the latest census sources for target cities, including measures on 13 dimensions: 'age', 'deprivation', 'education', 'employment', 'ethnicity', 'household_composition', 'household_language', 'income', 'marital_status', 'mode_of_travel', 'place_of_birth', 'sex' and 'tenure_type', which made the comprehensive dataset for London as 4835 (number of LSOAs)*93 (sub-indicators), and 11171 (number of the census units)*109 (sub-indicators)

for Sydney. After data cleaning and pre-processing, like dropping indicators with missing values or those highly-skewed, removing those variables with too many strong correlations, and data transformation operation on normalisation. The final retained variables are listed in Table 2:

Table 2 SES Variables for Clustering

City	Retained Variables
London	• Age 10 to 14, Age 16 to 17, Age 30 to 44, Age 20 to 24, Age 0 to 4, Age 25 to 29, Age 45 to 59, Age 8 to 9, Age 90 and over, Age 5 to 7, Age 85 to 89 • Household is not deprived in any dimension, Household is deprived in 4 dimensions, Household is deprived in 1 dimension • Level 3 qualifications, Apprenticeship, No qualifications, Other qualifications • Economically active: Self-employed with employees, Economically inactive: Looking after home or family, Economically inactive: Student (including full-time students), Economically active: Full-time student, Economically active: Self-employed without employees • Other ethnic group: Arab, Other ethnic group: Any other ethnic group, Mixed/multiple ethnic groups, Asian/Asian British • One person household, Divorced or formerly in a same-sex civil partnership which is now legally dissolved, In a registered same-sex civil partnership • Taxi, Motorcycle, scooter or moped, On foot, Underground, metro, light rail, tram, Bicycle, Train, Europe • United Kingdom: Northern Ireland, Europe: Ireland, Europe: Jersey, Europe: Guernsey, Europe: Isle of Man, Europe: United Kingdom not otherwise specified • Females, Males • Shared ownership (part owned and part rented), Living rent free
Sydney	• 30-34 years, 10-14 years, 40-44 years, 25-29 years, 15-19 years, 45-49 years, 0-4 years, 5-9 years, 75-79 years • Quartile 1, Quartile 2, Quartile 3, Quartile 4 • Advanced Diploma and Diploma Level, Postgraduate Degree Level, Secondary Education - Years 9 and below, Graduate Diploma and Graduate Certificate Level, Bachelor Degree Level, Certificate III & IV Level, Secondary Education - Years 10 and above • Unemployed, looking for full-time work, Unemployed, looking for part-time work, Employed, worked part-time, Not in the labour force, Employed, worked full-time, Employed, away from work • North-West European, North-East Asian, Southern and Central Asian, North African and Middle Eastern, Peoples of the Americas, South-East Asian, Oceanian, Southern and Eastern European • Multiple family household, Non-family household, One family household • Eastern Asian Languages, Northern European Languages, Southwest and Central Asian Languages, Southern Asian Languages, Other Languages, Southern European Languages, Southeast Asian Languages • \$400-\$499 (\$20,800-\$25,999), \$800-\$999 (\$41,600-\$51,999), \$1,750-\$1,999 (\$91,000-\$103,999), Negative income, \$3,000 or more (\$156,000 or more), \$1,500-\$1,749 (\$78,000-\$90,999), \$150-\$299 (\$7,800-\$15,599) • Widowed, Never married, Divorced, Married • Motorbike/scooter, Car, as driver, Taxi, Bicycle, Car, as passenger, Train, Bus, Truck • Americas, Oceania and Antarctica, North-West Europe, South-East Asia • Male, Female • Rented, Owned with a mortgage, Owned outright

This data was clustered by machine learning KMeans algorithm (provided in Scikit-learn package) to provide contextual clusters. This is in order to separate the target dataset, say by of N samples, into K disjoint clusters C by equal variance and minimised inertia (also known as within-cluster sum-of-squares, WCSS) as described in equation 2.

$$\sum_{i=0}^n \min_{\mu_j \in C} (\|x_i - \mu_j\|^2) \quad (2)$$

where μ_j is the mean of samples in each cluster. The WCSS criteria had been picked to choose the optimal number of clusters, by repeating the aforementioned algorithm for possible clusters in the range of interest from 3 clusters to 11 clusters and plot the average WCSS respectively. It is found that the optimal “turning” point for least WCSS is 6, which indicated an optimal cluster number at 6 and further fit into the spatial regression models, for the purpose of predicting crime and providing evidence for crime prevention priority strategies.

To account for the spatial dependence from nearby neighbours in space, this study applied the Spatial Lag Regression (SLM) model and Spatial Error Regression (SEM) model to measure the crime-influential associations. The SLM model in equation (3) captures spatial diffusion process on crime change from neighbouring units, by incorporating the spatial lag value of the spatial unit in the regression model. The SEM model in equation (4) assumes the observed spatial autocorrelation is caused by an independent variable (or variables, the matrix of X)

$$Y = \beta_0 + \beta X + \rho WY + \zeta \quad (3)$$

$$Y = \beta_0 + \beta X + \lambda W\varepsilon + \zeta \quad (4)$$

where Y is an n*1 matrix of the dependent variable (crime change) at n spatial units (number of census units), β_0 is the interception value, β and X are both n*k matrices of regression coefficients and k independent variables, ρ is the autoregressive parameter which indicates the extent to which spatial autocorrelation in Y is explained by the neighbouring values of Y. λ is the autoregressive parameter which indicates the extent to which the autocorrelation in the errors accounts for the autocorrelation observed in Y. ε is an n*1 matrix of autocorrelated error terms, W is an n * n matrix of spatial weights, and ζ is an n*1 matrix of independent and identically distributed error values.

Results

Mobility change among cities

Apple daily Mobility Data in 2020 was utilised to present the time-series trend for city mobility in Fig.4. The yellow rectangular boxes in figure 4 highlight the lockdown milestones.

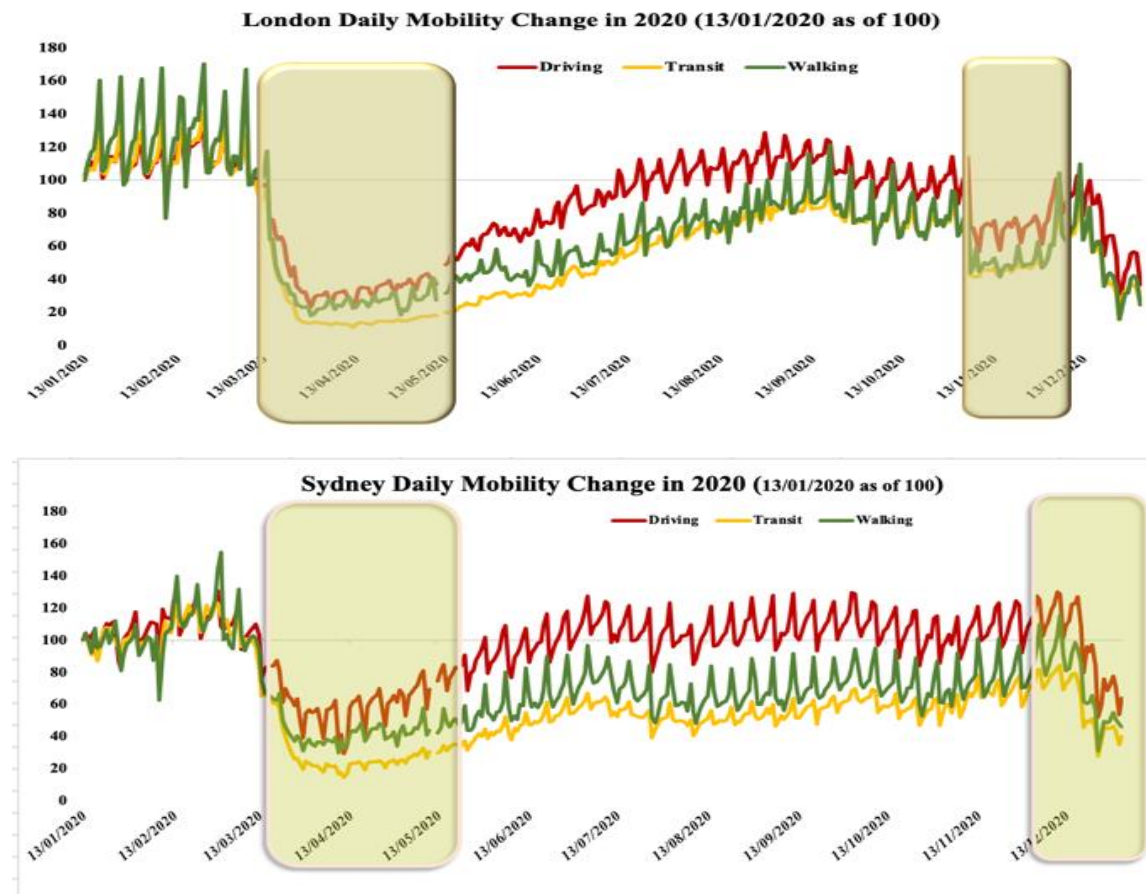


Fig. 4 Daily Mobility Change Trends in 2020

Taking the mobility index of 13th January 2020 as the benchmark for each city, it was obvious that mobility dropped significantly during each lockdown, especially during the early stages of each. This same trend is noticeable regardless of the mobility mode or the city. To get a vivid impression of the mobility change in the context of each city specifically, spatial exploration of at the finest geographical scale could be realised in an interactive way. Both monthly and daily mobility change data among finest geographical units (LSOA and SA2) could be accessed from <http://comparecitycrime.com>

To investigate the relationship between mobility change and crime change, this study goes on to explore monthly crime changes of the main crime categories - property crime and violent crime - as presented in section 5.2.

Inter-city monthly crime change by main categories (2020 vs. 2019)

In Fig.6, monthly crime changes in 2020 can be seen alongside year-on-year crime rates in 2019. The graph visualises overall crime rate, property crime rate and violent crime rate respectively, to compare the impact of lockdowns on crime changes. Once again, yellow rectangular frames are used to highlight the lockdown periods in each city (shaded in light yellow).

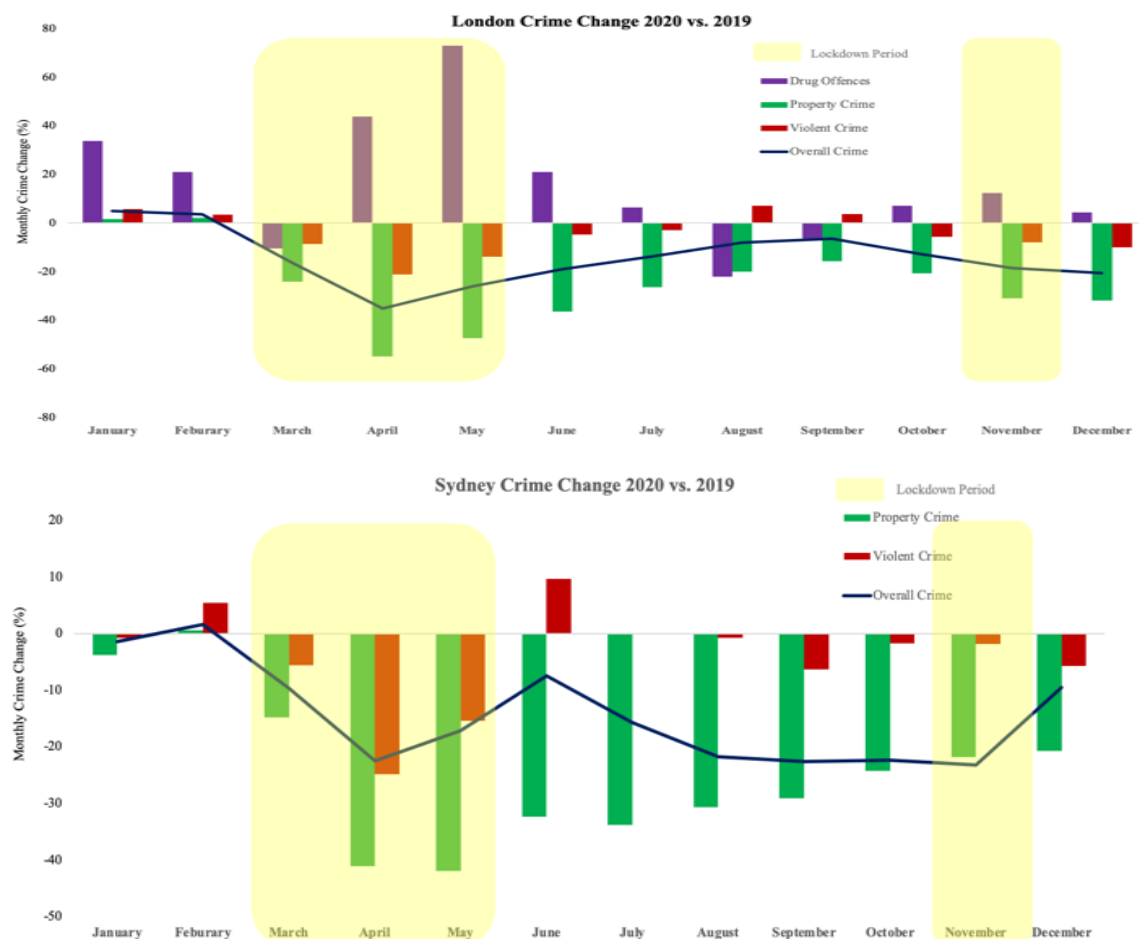


Fig.5 Monthly Crime Changes by Category

When compared to the previous year, the monthly changes in overall crime rate witnessed a cliff-drop reduction for all target cities during their first lockdowns (i.e. March to May), and for a majority part of their second lockdowns (i.e. November to December). Since property crimes represent a large proportion of overall crimes, the property crime rate shared similar impacts as overall crimes in response to lockdown. There was a general decreasing trend in the property crime rate during lockdowns. There was an exceptional case in Sydney during the second lockdown, but with a relatively mild change to the crime rate. Violent crimes across both cities shared similar dramatic drops during the first lockdown when compared to

2019. However, unlike property crime rates, violent crime rates remained steady in the second lockdown.

Inner-city crime change breakdowns during lockdown months

To locate the prominent crime changes among research units (SA2 in Sydney, and LSOAs in London), it is crucial not only to describe the crime change breakdowns by category (Fig.6 and 8), but also to map the spatial patterns during each lockdown month. Doing so highlights the areas that experience the most significant crime increase and decrease (Fig.7 and 9).

Sydney

When compared year-on-year against data from 2019, the variance in crime rate fluctuated according to the type of crime across the lockdown months of March, April, May, and December. During the first lockdown, from March to May, (the winter season in Sydney) there were significant increases in violent crimes like homicide. The data also shows increased crime rates for several types of offences, including pornography, prostitution and owning weapons in the March. General Strain Theory hosts certain explanatory capability for these trends (Agnew, 1992). For example, offences such as pornography might be used as a mechanism to release the strain caused by lockdowns. For sex workers, lockdowns might largely cut off their legitimate income sources, and the perishing financial situation forced them to rely on the street business further. During the same period, there were obvious year-on-year decreases in gaming offences, kidnapping, liquor offences and robbery. Similar crime change impacts were reflected in April and May, and even in December, during the second lockdown. This can be well explained by RAT (Cohen & Felson's, 1979), given that mobility of motivated offenders and suitable targets is constrained, and people are mostly staying at homes as capable guardians. Blackmail and extortion became the dominating category to experience increased crime rates, quadrupling by the end of the year. These two types of crime might have risen because mobility and direct contact between offenders and victims is not necessary, which thus had not been impacted by lockdowns. Theft, as the main crime type, didn't experience much change during the lockdown; there was a slight decrease in the number of theft cases during the lockdown first period. This trend for theft can be seen in parallel with another type of crime: transport regulatory offences. Overall, these findings are consistent with the mobility change trends seen upon implementation of NPI measures under lockdown policy.

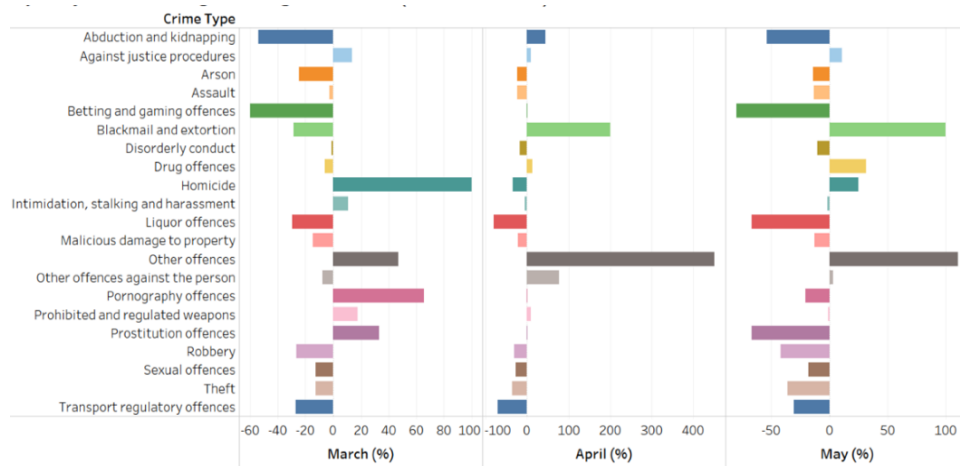


Fig. 6 Sydney Crime Change (%) During Lockdowns (2020 vs. 2019) by Category

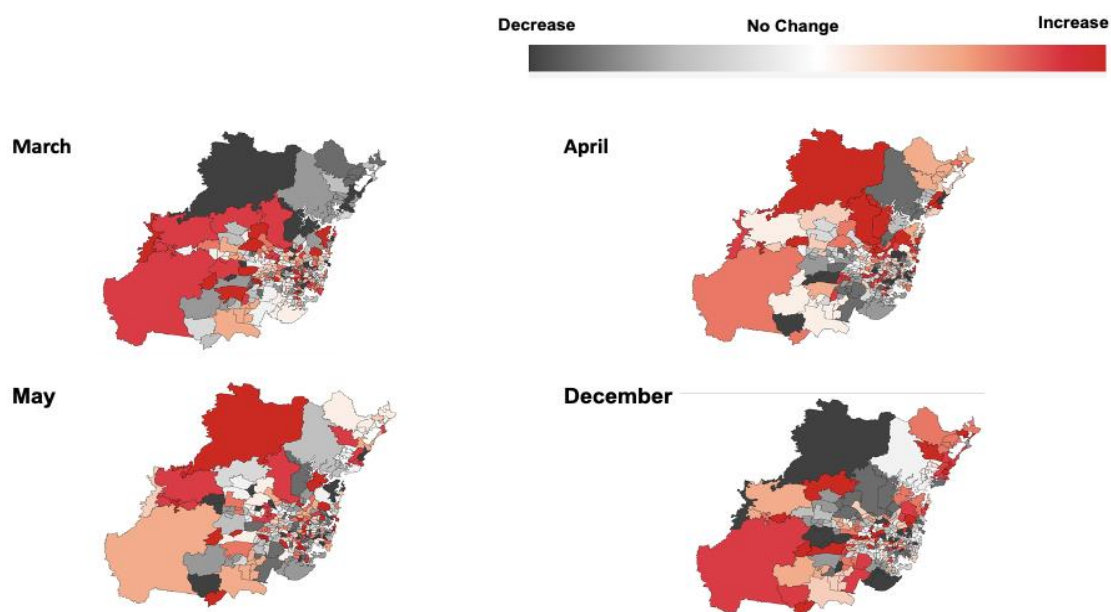


Fig. 7 Sydney Crime Change (%) During Lockdowns (2020 vs. 2019) by SA2 Units

London

London witnessed the most significant crime rate drop during the first lockdown, especially for crime types like theft, burglary, and robbery. These categories saw an average decrease of more than 50% year-on-year, dropping most dramatically in April. There were comparable decreases in Violence Against the Person cases in April (down 30%), and Possession of Weapons dropped in March (by over 30%). These patterns are consistent with the findings of most researchers (e.g., Abrams, 2021; Langton et al., 2021; Payne et al., 2020), who attributed the substantial decline of violent crimes to various COVID-19 containment measures.

However, some other crimes - such as Domestic Abuse and Anti-Social Behaviour - saw large increases during the lockdown period when compared to 2019. Lockdowns largely boost the chance of encounters between offenders and victims of domestic violence (RAT is well applicable here). In addition, pressure during lockdowns could somewhat bring down the mental and emotional conditions of couples, which then enhanced the likelihood of violence and confrontation within families. Similarly to many other studies (e.g., Niles et al., 2021; Zaami et al., 2020), we also found illegal drug offences increased by over 50% in May compared to 2019 and continued increasing into the second lockdown in November. According to GST, drug abuse could be one possible strategy used by many people to alleviate or escape from strains and other mental sufferings caused by lockdowns and the pandemic.

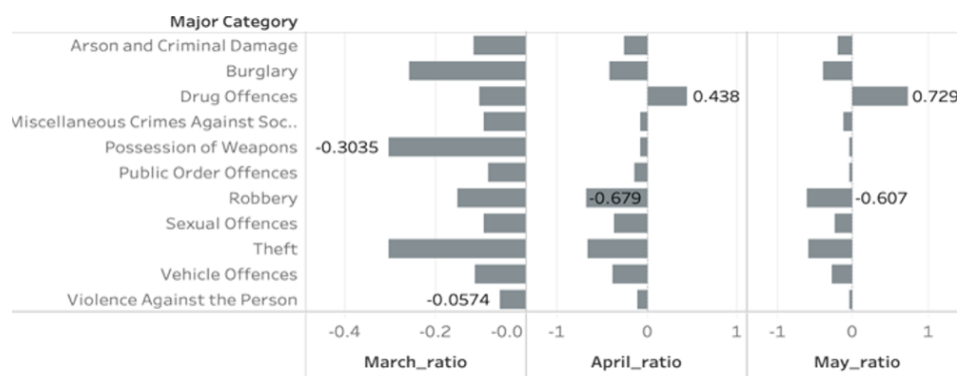


Fig. 8 London Crime Change (%) During Lockdowns (2020 vs. 2019) by Category

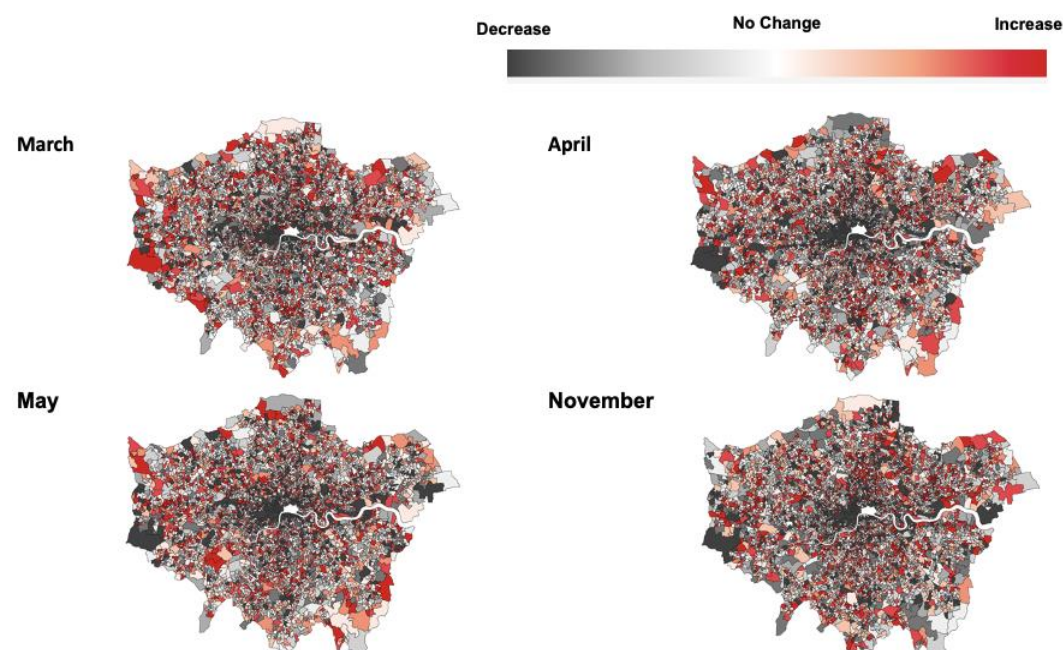


Fig. 9 London Crime Change (%) During Lockdowns (2020 vs. 2019) by LSOAs

The visualisation of results identified hot spots in both cities where the crime rate had dropped significantly. These areas with the greatest reduction in crime centred around transportation hubs and city centre areas, which is consistent with the hypothesis that mobility-related crime decreases during periods of national lockdown. It also demonstrates increasing crime rates in parks and other outdoor leisure spaces, in line with the RAT hypothesis that a lack of surveillance, or guardianship, results in increased delinquency. Alongside the overarching trends, the results depict an emerging increase of certain crimes, i.e. cybercrime, and a rocketing increase in drug-dealing over the lockdown periods. These crimes were found to occur in rural areas and parks in the city outskirts, possibly related to tension as defined in the GST model.

Localised Socio-Economic-Status (SES) Clustering and Spatial Regression

Upon applying K-Means clustering technique on selected demographical, social, and economic status (SES) variables at the finest geographical scale, an optimal 6 clusters was found in both target cities. The clustering features were included in a spatially weighted regression model on crime change and mobility change, for prediction purposes.

Taking into consideration of the neighbouring regions' influences on crime change, the mobility change and regional SES profiling, spatial lag model (SLM) and spatial error model (SEM) had been compared to identify the most influential factors on crime change against lockdowns in Table 3. In London, mobility change and neighbouring regions' crime change had exhibited significant positive influences on crime change; in exception with the insignificant relation between crime change and local SES features. However, Sydney's crime change had been identified as only affected by its neighbouring areas' crime changes, rather than the mobility change throughout lockdowns.

Table 3 Spatial Regressions between London and Sydney

		London		Sydney	
		SLM	SEM	SLM	SEM
1st Lockdown (i.e., April)	R-squared	0.553	0.068	0.198	0.002
	Mobility Change	0.304***	0.342***	0.011	-0.118
	SES Cluster	0.178	0.129	-1.351	-0.821
	Neighbours' Crime Change	0.127***	0.130***	0.087***	0.091***
2nd Lockdown (i.e., November /December)	R-squared	0.534	0.062	0.005	0.002
	Mobility Change	0.375***	0.397***	0.273	0.349
	SES Cluster	0.149	0.118	0.399	-0.241
	Neighbours' Crime Change	0.125***	0.127***	0.082***	0.084***

Conclusion and discussion

The study modelled mobility change related crime changes in target cities, London and Sydney, to identify places where the crime types experienced the most significant drops during lockdowns (e.g., transit hubs, city centres, etc.), where the main types of crime jumped high due to lack of surveillance (e.g., national parks, public venues, etc.), and where the crimes bounced back due to tension resentment or strain expression, and where were the hot spots for city-featured emerging crime types (e.g., blackmail, drug offences, etc.). It also highlighted the driving effect from mobility change to crime change during lockdown periods in London, but this was not the case in Sydney. The changes in crime patterns during the pandemic provide a natural experiment for two prominent criminological theories: RAT and GST. It is safe to conclude that the impacts of the Covid-19 pandemic on the decline of most crimes greatly rest on RAT as people's mobility is constrained by lockdowns and the crime triangle of RAT is disrupted. GST, in addition, can be used to explain the increase of particular types of crimes, such as domestic violence and drug abuse, which could be a result of people's coping mechanisms to escape from the mental and emotional pressure caused by lockdowns and other sufferings of the pandemic. However, we could not ignore a major analysis problem of the current study that the theoretical hypotheses regarding the impact of RAT and GST cannot be warranted by the descriptive and explorative data set. In future studies, dependent variables measuring the actual strain levels people have experienced and changes of routine activities should be included for advanced logistic regression to test how the two theories can account for the changes of different crimes during the pandemic.

The work is expected not only to generate some comparative data-driven evidence for city policy makers on crime prevention strategies and efficient policing, but also to build up a replicable workflow/model based on the identified similarities among target cities, to expand further to a broader range of cities. As crime takes new forms and dynamics during the pandemic, law enforcement agencies should accordingly modify and re-allocate police resources for the emerging priorities. The temporal trends-predictive models based on past observations may not be sufficiently informative now (Campedelli et al., 2020). Therefore, alternative predictive tools, which are capable of considering disruptions of social life as the triggers of new criminal risks, are urgently needed for data-driven strategies to re-assess criminal trends and prevention strategies.

References

- Abrams, D. S. (2021). COVID and crime: An early empirical look. *Journal of Public Economics*, 194, 104344. <https://doi.org/10.1016/j.jpubeco.2020.104344>
- Agnew, R. (1992). Foundation for a General Strain Theory of Crime and Delinquency. *Criminology*, 30(1), 47–88.
- Agnew, R. (2002). Experienced, vicarious, and anticipated strain: An exploratory study on physical victimization and delinquency. *Justice Quarterly*, 19(4), 603–632. <https://doi.org/10.1080/07418820200095371>
- Agnew, R. (2010). A general strain theory of terrorism. *Theoretical Criminology*, 14(2), 131–153. <https://doi.org/10.1177/1362480609350163>
- Agnew, R. (2015). Using general strain theory to explain crime in Asian societies. *Asian Journal of Criminology*, 10(2), 131–147. <https://doi.org/10.1007/s11417-014-9198-2>
- Agnew, R., & White, H. R. (1992). An Empirical Test of General Strain Theory. *Criminology*, 30(4), 475–500. <https://doi.org/10.1111/j.1745-9125.1992.tb01113.x>
- Andresen, M. A. (2006). Crime measures and the spatial analysis of criminal activity. *British Journal of Criminology*, 46(2), 258–285. <https://doi.org/10.1093/bjc/azi054>
- Ashby, M. P. J. (2020). Initial evidence on the relationship between the coronavirus pandemic and crime in the United States. *Crime Science*, 9(1), 6. <https://doi.org/10.1186/s40163-020-00117-6>
- Balmori de la Miyar, J. R., Hoehn-Velasco, L., & Silverio-Murillo, A. (2020). Druglords don't stay at home: COVID-19 pandemic and crime patterns in Mexico City. *Journal of Criminal Justice*, 72(August 2020), 101745. <https://doi.org/10.1016/j.jcrimjus.2020.101745>
- Boman, J. H., & Gallupe, O. (2020). Has COVID-19 Changed Crime? Crime Rates in the United States during the Pandemic. *American Journal of Criminal Justice*, 45(4), 537–545. <https://doi.org/10.1007/s12103-020-09551-3>
- Boserup, B., McKenney, M., & Elkbulli, A. (2020). Alarming trends in US domestic violence during the COVID-19 pandemic. *American Journal of Emergency Medicine*, 91(20), 3–5. <https://doi.org/10.1016/j.ajem.2020.04.077>
- Broidy, L. M. (2001). A test of general strain theory. *Criminology*, 39(1), 9–36. <https://doi.org/10.1111/j.1745-9125.2001.tb00915.x>
- Bu, F., Steptoe, A., & Fancourt, D. (2020). Loneliness during a strict lockdown: Trajectories and predictors during the COVID-19 pandemic in 38,217 United Kingdom adults. *Social Science and Medicine*, 265(October), 113521. <https://doi.org/10.1016/j.socscimed.2020.113521>
- Buil-Gil, D., Miró-Llinares, F., Moneva, A., Kemp, S., & Díaz-Castaño, N. (2020). Cybercrime and shifts in opportunities during COVID-19: a preliminary analysis in the UK. *European Societies*, 1–13. <https://doi.org/10.1080/14616696.2020.1804973>

- Buil-Gil, D., & Zeng, Y. (2021). Meeting you was a fake: investigating the increase in romance fraud during COVID-19. *Journal of Financial Crime*. <https://doi.org/10.1108/JFC-02-2021-0042>
- Campedelli, G. M., Aziani, A., & Favarin, S. (2020). Exploring the Immediate Effects of COVID-19 Containment Policies on Crime: an Empirical Analysis of the Short-Term Aftermath in Los Angeles. *American Journal of Criminal Justice*. <https://doi.org/10.1007/s12103-020-09578-6>
- Clemens, E. S. (2020). From the editor: In eventful times. *American Journal of Sociology*, 126(1), 1–5.
- Cohen, L. E., & Felson, M. (1979). Social Change and Crime Rate Trends: A Routine Activity Approach. *American Sociological Review*, 44(4), 588–608.
- Dai, M., Xia, Y., & Han, R. (2021). The impact of lockdown on police service calls during the COVID-19 pandemic in China. *Policing: A Journal Of Policy And Practice*, 1–15. <https://doi.org/10.1093/police/paab007>
- Dugan, L., & Apel, R. (2005). The differential risk of retaliation by relational distance: A more general model of violent victimization. *Criminology*, 43(3), 697–730. <https://doi.org/10.1111/j.0011-1348.2005.00021.x>
- Felson, M., Jiang, S., & Xu, Y. (2020). Routine activity effects of the Covid-19 pandemic on burglary in Detroit, March, 2020. *Crime Science*, 9(1), 1–7. <https://doi.org/10.1186/s40163-020-00120-x>
- Frailing, K., & Harper, D. W. (2017). *Toward a Criminology of Disaster: What We Know and What We Need to Find Out*. Palgrave Macmillan.
- Frenkel, M. O., Giessing, L., Egger-Lampl, S., Hutter, V., Oudejans, R. R. D., Kleygrewe, L., Jaspert, E., & Plessner, H. (2021). The impact of the COVID-19 pandemic on European police officers: Stress, demands, and coping resources. *Journal of Criminal Justice*, 72(October 2020), 101756. <https://doi.org/10.1016/j.jcrimjus.2020.101756>
- Goolsbee, A., & Syverson, C. (2021). Fear, lockdown, and diversion: Comparing drivers of pandemic economic decline 2020. *Journal of Public Economics*, 193, 104311. <https://doi.org/10.1016/j.jpubeco.2020.104311>
- Gover, A. R., Harper, S. B., & Langton, L. (2020). Anti-Asian Hate Crime During the COVID-19 Pandemic: Exploring the Reproduction of Inequality. *American Journal of Criminal Justice*, 45(4), 647–667. <https://doi.org/10.1007/s12103-020-09545-1>
- Halford, E., Dixon, A., Farrell, G., Malleson, N., & Tilley, N. (2020). Crime and coronavirus: Social distancing, lockdown, and the mobility elasticity of crime. *Crime Science*, 9(1), 1–12. <https://doi.org/10.1186/s40163-020-00121-w>
- Hayes, B. E. (2018). Repeat Victimization Among Intimate Partner Violence Victims: The Impact of Guardianship. *Feminist Criminology*, 13(2), 138–159. <https://doi.org/10.1177/1557085116651714>

- Haug, N., Geyrhofer, L., Londei, A. et al. Ranking the effectiveness of worldwide COVID-19 government interventions. *Nat Hum Behav* 4, 1303–1312 (2020).
<https://doi.org/10.1038/s41562-020-01009-0>
- Hipp, J. R., & Yates, D. K. (2011). Ghettos, thresholds, and crime: Does concentrated poverty really have an accelerating increasing effect on crime? *Criminology*, 49(4), 955–990.
<https://doi.org/10.1111/j.1745-9125.2011.00249.x>
- Hodgkinson, T., & Andresen, M. A. (2020). Show me a man or a woman alone and I'll show you a saint: Changes in the frequency of criminal incidents during the COVID-19 pandemic. *Journal of Criminal Justice*, 69(June), 101706.
<https://doi.org/10.1016/j.jcrimjus.2020.101706>
- Hooghe, M., Vanhoutte, B., Hardyns, W., & Bircan, T. (2011). Unemployment, inequality, poverty and crime: Spatial distribution patterns of criminal acts in Belgium, 2001-06. *British Journal of Criminology*, 51(1), 1–20. <https://doi.org/10.1093/bjc/azq067>
- Hulme, S., Morgan, A., & Boxall, H. (2019). Domestic violence offenders, prior offending and reoffending in Australia. *Trends and Issues in Crime and Criminal Justice*, 580, 1–22.
- Kawohl, W., & Nordt, C. (2020). COVID-19, unemployment, and suicide. *The Lancet Psychiatry*, 7(5), 389–390. [https://doi.org/10.1016/S2215-0366\(20\)30141-3](https://doi.org/10.1016/S2215-0366(20)30141-3)
- Kim, D. Y., & Phillips, S. W. (2021). When COVID-19 and guns meet: A rise in shootings. *Journal of Criminal Justice*, 73(December 2020).
<https://doi.org/10.1016/j.jcrimjus.2021.101783>
- Krishnakumar, A., & Verma, S. (2021). Understanding Domestic Violence in India During COVID-19: a Routine Activity Approach. *Asian Journal of Criminology*, 16(1), 19–35.
<https://doi.org/10.1007/s11417-020-09340-1>
- Langton, S., Dixon, A., & Farrell, G. (2021). Six months in: pandemic crime trends in England and Wales. *Crime Science*, 10(1), 1–16. <https://doi.org/10.1186/s40163-021-00142-z>
- Leitner, M., Barnett, M., Kent, J., & Barnett, T. (2011). The Impact of Hurricane Katrina on reported Crimes in Louisiana: A spatial and temporal analysis. *Professional Geographer*, 63(2), 244–261. <https://doi.org/10.1080/00330124.2010.547156>
- Lemieux, T., Milligan, K., Schirle, T., & Skuterud, M. (2020). Initial impacts of the COVID-19 pandemic on the Canadian labour market. *Canadian Public Policy*, 46(1), S55–S65.
<https://doi.org/10.3138/CPP.2020-049>
- LGA. Public Health Order for Northern Beaches LGA (Press Release). 2020. NSW Health Department. https://www.health.nsw.gov.au/news/Pages/20201219_03.aspx 19 December 2020. Retrieved 5 June 2021.
- Liu, J., Zhang, Y., & Wang, X. (2021). Covid-19 and Asian Criminology: Uncertainty, complexity, and the responsibility of AJOC amidst eventful times. *Asian Journal of Criminology*, 16(1), 1–4. <https://doi.org/10.1007/s11417-021-09347-2>

Mccarthy, M., Homel, J., Ogilvie, J., & Allard, T. (2021). Initial impacts of COVID-19 on youth offending: An exploration of differences across communities. *Journal of Criminology*, 1–21. <https://doi.org/10.1177/00048658211005816>

Mohler, G., Bertozzi, A. L., Carter, J., Short, M. B., Sledge, D., Tita, G. E., Uchida, C. D., & Brantingham, P. J. (2020). Impact of social distancing during COVID-19 pandemic on crime in Los Angeles and Indianapolis. *Journal of Criminal Justice*, 68, 101692. <https://doi.org/10.1016/j.jcrimjus.2020.101692>

Niles, J. K., Gudin, J., Radcliff, J., & Kaufman, H. W. (2021). The Opioid Epidemic within the COVID-19 Pandemic: Drug Testing in 2020. *Population Health Management*, 24(S1), S43–S51. <https://doi.org/10.1089/pop.2020.0230>

Nivette, A. E., Zahnow, R., Aguilar, R., Ahven, A., Amram, S., Ariel, B., Burbano, M. J. A., Astolfi, R., Baier, D., Bark, H.-M., Beijers, J. E. H., Bergman, M., Breetzke, G., Concha-Eastman, I. A., Curtis-Ham, S., Davenport, R., Díaz, C., Fleitas, D., Gerell, M., ... Eisner, M. P. (2021). A global analysis of the impact of COVID-19 stay-at-home restrictions on crime. *Nature Human Behaviour*. <https://doi.org/10.1038/s41562-021-01139-z>

Payne, J. L., Morgan, A., & Piquero, A. R. (2020). COVID-19 and Social Distancing Measures in Queensland Australia Are Associated with Short-term Decreases in Recorded Violent Crime. *Journal of Experimental Criminology*.

Piquero, A. R., Jennings, W. G., Jemison, E., Kaukinen, C., & Knaul, F. M. (2021). Domestic violence during the COVID-19 pandemic - Evidence from a systematic review and meta-analysis. *Journal of Criminal Justice*, 74(February), 101806. <https://doi.org/10.1016/j.jcrimjus.2021.101806>

Piquero, A. R., Riddell, J. R., Bishopp, S. A., Narvey, C., Reid, J. A., & Leeper Piquero, N. (2020). Staying Home, Staying Safe? A Short-Term Analysis of COVID19 on Dallas Domestic Violence. *American Journal of Criminal Justice*, 45(4), 601–635.

Rashid, S. (2021). Impact of COVID-19 on Selected Criminal Activities in Dhaka, Bangladesh. *Asian Journal of Criminology*, 16(1), 5–17. <https://doi.org/10.1007/s11417-020-09341-0>

Reynald, D. M. (2010). Guardians on guardianship: Factors affecting the willingness to supervise, the ability to detect potential offenders, and the willingness to intervene. *Journal of Research in Crime and Delinquency*, 47(3), 358–390. <https://doi.org/10.1177/0022427810365904>

Robertson, A. R., Stein, J. A., & Schaefer-Rohleder, L. (2010). Effects of hurricane katrina and other adverse life events on adolescent female offenders: A test of general strain theory. *Journal of Research in Crime and Delinquency*, 47(4), 469–495. <https://doi.org/10.1177/0022427810375577>

Stickle, B., & Felson, M. (2020). Crime Rates in a Pandemic: the Largest Criminological Experiment in History. *American Journal of Criminal Justice*, 45(4), 525–536. <https://doi.org/10.1007/s12103-020-09546-0>

WHO. (2021). WHO Coronavirus Disease (COVID-19) Dashboard. <https://www.who.int/>

Xu, J. (2009). The robbery of motorcycle taxi drivers (dake zai) in China. *British Journal of Criminology*, 49(4), 491–512. <https://doi.org/10.1093/bjc/azp024>

Xu, J., Sun, G., Cao, W., Fan, W., Pan, Z., Yao, Z., & Li, H. (2021). Stigma, Discrimination, and Hate Crimes in Chinese-Speaking World amid Covid-19 Pandemic. *Asian Journal of Criminology*, 16(1), 51–74. <https://doi.org/10.1007/s11417-020-09339-8>

Zaami, S., Marinelli, E., & Vari, M. R. (2020). New Trends of Substance Abuse During COVID-19 Pandemic: An International Perspective. *Frontiers in Psychiatry*, 11(July), 1–4. <https://doi.org/10.3389/fpsyt.2020.00700>

Zahran, S., Shelley, T., Peek, L., & Brody, S. (2009). Natural disasters and social order: Modeling crime outcomes in Florida. *International Journal of Mass Emergencies and Disasters*, 27(1), 26–52.

Zhang, H. (2020). The Influence of the Ongoing COVID-19 Pandemic on Family Violence in China. *Journal of Family Violence*. <https://doi.org/10.1007/s10896-020-00196-8>.

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