Social infrastructure:
international comparative review

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1. Introduction

The British Academy report, Shaping the COVID Decade, included a call to 'strengthen and expand [the] community-led social infrastructure that underpins the vital services and support structures needed to enhance local resilience, particularly in the most deprived areas' (the British Academy, 2021a, p. 34). In response, the British Academy funded this international comparative evidence review to examine what constitutes 'social infrastructure' in the UK and in different international contexts. The work has been carried out by the Institute for Community Studies in collaboration with the Bennett Institute for Public Policy. This research combined a literature review, in conjunction with targeted expert interviews, in selected global regions.

Understanding social infrastructure

There is no agreed definition of 'social infrastructure', and this research has not aimed to substantiate or generate its own definition of the concept. However, it is useful to briefly consider previous definitions to help sketch an overview of some of the ways social infrastructure can be understood.

A narrow European Commission definition (2018) relies on the education, health and housing tryptic – and, in the UK context, justice or prisons are sometimes added (Infrastructure and Projects Authority, 2016). It should also be noted that 'social infrastructure' is terminology almost exclusively used in English-speaking countries, and proxy terms will need to be sought in other languages (eg French and German literatures generally treat public places as an element of 'social cohesion' policies).

Literature on social infrastructure typically treats it as encompassing 'life-long social service needs related to health, education, early childhood, community support, community development, culture, sport and recreation, parks and emergency services.' (Davern et al., 2017, p. 194).

Specific definitions most commonly revolve around three key approaches:

- Social infrastructure as the physical places that encourage social interaction (Klinenberg, 2018a)
- Social infrastructure as created through public services, laws, and institutions (Nabatchi & Leighninger, 2015)
- Social infrastructure as voluntary and community sector infrastructure (Gregory, 2018)

These three approaches offer a framing for understanding the different ways this concept is used by various authors across differing contexts. It is also possible to draw these approaches together under an umbrella definition that encompasses them all. For the purposes of this paper and the wider review, the definition used in the Bennett Institute's report on the Value of Social Infrastructure will be used as a starting point:

> *'Policymakers [should] treat social infrastructure as those physical spaces in which regular interactions are facilitated between and within the diverse sections of a community, and where meaningful relationships, new forms of trust and feelings of reciprocity are inculcated among local people.' (Kelsey & Kenny, 2021, p. 11).*

Closely related to the concept of social infrastructure is that of social capital. While many definitions exist, Robert Putnam's is perhaps most widely used, and is adopted for the purposes of this paper. Putnam describes social capital as 'social networks and the norms of reciprocity and trustworthiness that arise from them' (1993, p. 19). Or, in the words of the Bennett Institute, 'the accumulated trust within communities and institutions and ability of a community to be more than the sum of its individual actions.' (Bennett Institute for Public Policy, 2019, p. 7).

Putnam identifies two strands of social capital within this: 'bonding' and 'bridging' (Putnam, 1995a). The former exists in the ties that connect homogeneous or related groups; the latter brings together different heterogeneous groups. Finally, 'linking' social capital is commonly included in this definition, in relationships that span power and authority differences (Szreter & Woolcock, 2004).

The policy context in the UK

The broader policy context for this project is the Levelling Up White Paper, published in February 2022, which set out the government's plans to address regional inequalities across the UK. In his forward to the White Paper, former Prime Minister Boris Johnson described levelling up as a programme 'to take the radical steps needed to make us more prosperous and more united by tackling the regional and local inequalities that unfairly hold back communities and to encourage private sector investment right across the UK' (DLHUC, 2022a, p. viii).

Yet, while the White Paper makes repeated references to 'social capital and social infrastructure' (typically in that order), alongside various claims about their impact on wider socio-economic outcomes, it does not offer a definition of social infrastructure, nor does it clarify what the government

believes the relationship is between the two concepts. For example, the White Paper argues that 'poor endowments of social capital and social infrastructure give rise to unsafe and unclean streets, weak community and cultural institutions [amplifying] the centrifugal economic and financial forces impacting these places', but leaves it to the reader to guess the precise causal mechanism.

To assist it in its task, the government proposes establishing a Levelling Up Advisory Council to provide independent expert advice. This will include a sub-committee with a specific remit for 'local communities and social infrastructure – the role of neighbourhood policies and strategies for building community capacity in left behind areas.' The government also proposes a new Strategy for Community Spaces and Relationships, underpinned by the following guiding principles:

a. **Community power** – making it easier for local people and community groups to come together to set local priorities and shape their neighbourhoods
b. **Understanding 'what works'** – building the evidence base to better understand how to support communities and put them in the driving seat to level up
c. **Listening to communities** – engaging with communities, local government and civil society to identify priorities, the assets that matter to local places, and the policies and actions needed to strengthen community infrastructure
d. **The idea that every community matters** – reaching out to engage with the most disconnected communities, and ensuring funding reaches those most in need.

The Levelling Up White Paper covers far more than this; there are 12 missions in total, intended to 'serve as the focal point around which the whole of government orientates itself, as well as catalysing new ideas and forging collaboration with the private sector and across different groups in society.' Yet success is likely to depend, in large part, on an understanding of where and how best to invest in social infrastructure, the effect this will have on the stock of social capital, and the consequential impact in inequality.

Additional policy questions that arise from the research presented in this report include:

- how different types of social infrastructure relate to different types of social capital
- the balance of social infrastructure provision between the public, private and third sector
- the difference between 'designed' social infrastructure and 'revealed' social infrastructure, as policymakers intentions and public reactions interact
- the importance of 'purpose' and 'relationship' as vital characteristics of social infrastructure.

Lessons from history:
Debates about social infrastructure

In 1963, the urban theorist Melvin Webber noted a common trope in how social infrastructure is narrativised in historical perspective (Webber, 1963). He observed a recurrent tendency to rhetorically exaggerate the idea of the 'decline of community' in the face of the supposed atomisation and impersonality of modernity. Various sociologists have insisted that communitarian infrastructure is being eclipsed by privatism and individualism (Putnam, 2001; Bauman, 2011). Such anxiety about the break-up of community is highly potent in contemporary public discourse, but this anxiety needs to be understood as a historical phenomenon rather than a uniquely novel question (Lawrence, 2019).

In the post-war period, various researchers became invested in tracing and locating 'community' in British society via social-scientific inquiry, which was still a nascent field at the time. Michael Young and Peter Willmott's now famous study, Family and Kinship in East London, seminally contended that the traditional social infrastructure that had thrived on the slum streets of Bethnal Green was at risk of disappearing as communities were broken up into new suburbs, where individualism was replacing former kinship models that had flourished between working-class residents living in close quarters (Young & Willmott, 1983). This thesis was echoed in a number of contemporary studies on post-war community and slum clearance in other cities (Hole, 1959; Mogey, 1969; Jennings, 1962). However, historians have recently done ground-breaking work – going back to re-analyse archived interview transcripts and notes from these studies – to highlight the positivist nature of this early work. They have noted how researchers cherry-picked and deployed material selectively to depict an idealised, rosy vision of social infrastructure in the slums, obfuscating the more diffuse and ambivalent responses offered by interviewees (Butler, 2015; Lawrence, 2016).

The old model of the terrace-housed, back-to-back street has been invested with many nostalgic and romanticised attachments as an idealised artery of social infrastructure (Moran, 2012). The appeal of this imagery was not limited to Britain, as the popularity of Jane Jacobs work on the 'sidewalk ballet' of her Greenwich Village neighbourhood attests (Jacobs, 2020). Nigel Henderson, Roger Mayne, and Shirley Baker immortalised this view of the street as a lost idyll of sociability in their striking photographs of children's play from London to Manchester in the 1950s and 1960s (Brooke, 2014). This vision of a lost world of working-class social life came to constitute what Chris Waters describes as a flattened 'urban pastoral', typified in the drawings of L.S. Lowry and ITV's Coronation Street – which was aestheticised in the face of more complex and diffuse iterations of sociability and community that were arising with increased affluence, urban development, and class restructuring (Waters, 1999). The extrapolating rise of mass consumption, car ownership, and leisure time required urban planners to seriously recalibrate the applicability of their traditionalised, positivist models of community structuring in the second half of the twentieth century (Kefford, 2018; Gunn, 2011; Greenhalgh, 2016). As former understandings of class have broken down (Bogdanor & Skidelsky, 1970; Savage, 2015), our approach to social infrastructure needs to be less retrospective and anachronistic than that which social scientists originally conceived.

Methods

Literature review

We reviewed academic, policy and grey literature with an iterative hermeneutic approach seeking geographic diversity across the globe, and a diversity of social infrastructure approaches. Four international regions were selected, to provide examples of social infrastructure in different contexts: the Nordic region; France and Belgium; Taiwan, South Korea, and Japan; Australia and New Zealand. This selection spans three continents, and includes culturally and politically diverse countries.

Interviews

Expert elicitation interviews were conducted to gather insight into social infrastructure in selected case study regions. Three interviews focused on Ohio in the United States, and two interviews on Taiwan, the Netherlands, Belgium, Australia, and Mexico City in Mexico, with one interview conducted in California in the United States, Indonesia, and Colombia. Interviewees are listed in Appendix A.

Interviewees were recruited based upon their experience and expertise in social infrastructure and included representatives from academia, policy-making, and civil society.

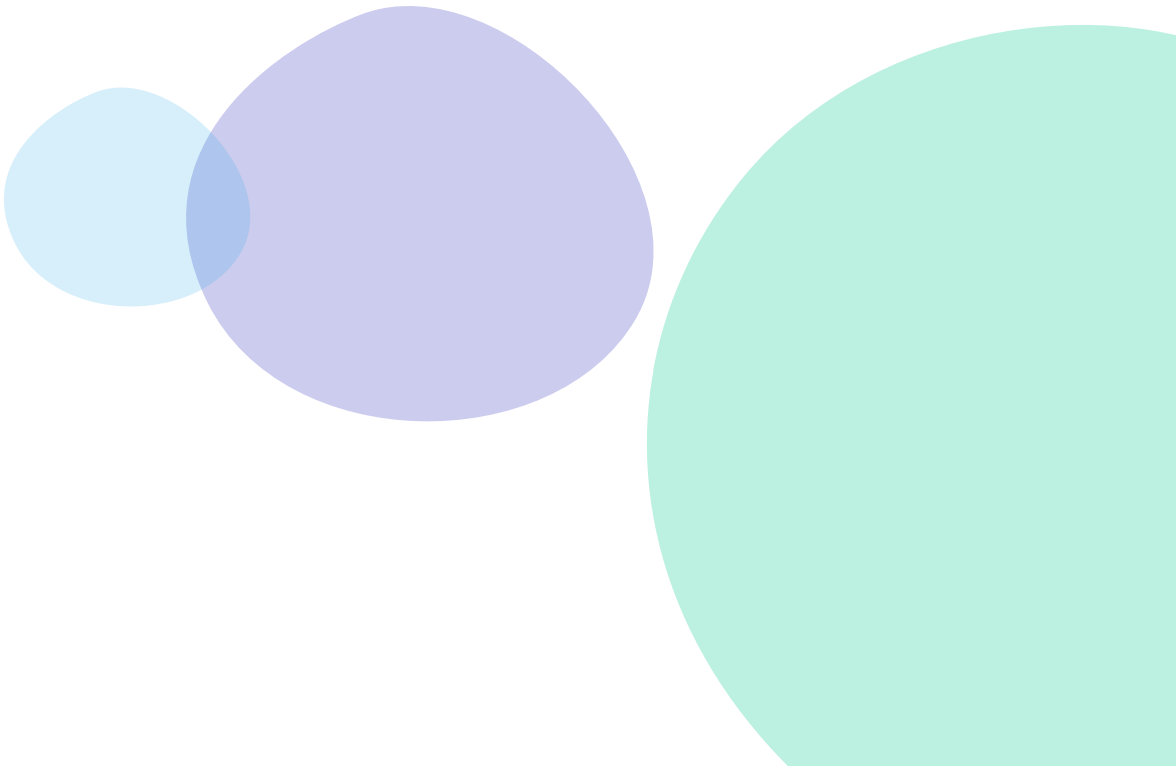
Interviews were 30 to 40 minutes long, conducted online, and transcribed for analysis using transcription software. Four researchers conducted the interviews and coded the data. A concept coding approach was used, followed by thematic analysis.

Limitations

Our literature review represents only a small selection of regions and cannot be considered comprehensive. Notably, the Americas have not been included in this review, but formed an important region of focus for our interviews. Furthermore, Europe is more strongly represented than other regions in this literature review, as the cultural and political proximity to the UK makes European approaches of particular interest when seeking examples that could inform UK policy. As such, this regional review should be read as a selection of diverse approaches, not as representative of social infrastructure across the globe.

Our interviews provided insight into some social infrastructure perspectives in each of our selected regions. However, these are not a complete or generalisable picture of social infrastructure in any of these global areas. Each of our interviewees had a particular interest or professional focus on social infrastructure, and thus their input reflects their specific context. The findings from the interviews should therefore be read as ideas and perspectives that can be taken on social infrastructure, opening up directions for further inquiry.

Overall, our research cannot provide comprehensive analysis of social infrastructure approaches across the globe. Rather, our findings offer a selection of themes that can act as lenses for further exploration of social infrastructure, and a selection of examples that can provide touchpoints of how social infrastructure can look in different places, for different people, at different times.



2. Findings

In this chapter, we share what we heard in our interviews and what we learned from our review of the literature. This is presented thematically, with the themes drawn from our interview findings providing the overarching structure. These six themes are:

- openness of purpose
- connectivity
- community voice
- connecting with the natural world
- social infrastructure as resistance
- inclusion of some is exclusion of others

Within each theme, we include information and ideas from across the different regions and countries our research covered. Interview findings are shared first, followed by findings from the literature review to contextualise these. We have also included some brief contextual notes that connect our findings to the recent British historical context and to a selection of international policy examples. This contextualisation aims to first draw links between our international findings and the British social and political landscape, and secondly to demonstrate how some of the ideas we discuss have been operationalised in different countries.

2.1 Openness of purpose

We found openness to be a useful guiding principle for navigating the ways in which social infrastructure can be designed and used to foster the greatest possible inclusivity. Across our interviews and reviewed literature, we found examples of the way that over-determination of the intended purpose of social infrastructure could inhibit inclusivity. We also learned about ways that openness could be 'designed in' to increase the diversity of social infrastructure's uses and affordances for different people. This points to a need for passive social infrastructure availability as well as a willingness to accept active repurposing of that infrastructure by communities.

Lessons from history:
Space as a category of analysis

Following the 'spatial turn' of the 1980s and 1990s (Torre, 2008), researchers have become increasingly attentive to the histories of specific spaces and sites of human activity. Historians have accordingly mined a rich seam of inquiry to explore the development of civic culture, social connectivity, and public health in particular spatial contexts. For instance, historians have done notable work on spaces of healthcare as key sites of communality, and also of potential friction, to consider how the British public has conceived of and negotiated the National Health Service (Bates, 2021; Redhead, 2021; see also the Wellcome-funded 'Sensing Spaces of Healthcare' project, and Agnes Arnold-Forster's forthcoming project, 'Working and Feeling in the Modern British Hospital'). Others have looked at the architecture and political landscape of council/social housing in post-war history to highlight the interplay between the differential phenomena of public welfarism, private domesticity, and associational activism (Shapely, 2006; Hollow, 2016; Firmin, 2019).

Furthermore, this turn to the spatial has led historians to identify and excavate more unexpected sites of social infrastructure in post-war British society, and to think about wellbeing more intimately and innovatively. Some have considered how rave spaces and dance cultures have acted as sites of counter-cultural expression, solidarity, and mutual connectivity (Hill, 2003; Nehring, 2007; Clark, 2021). Certain historians have focused on children's play spaces – both in the form of constructed 'adventure playgrounds' and of more incidental play cultures (Glasheen, 2019) – to think about children's social right to the city (Ward & Golzen, 1979). Other researchers have identified graffiti (Kindynis, 2018) and parkour (Bavinton, 2007) as methods by which ordinary people have mapped their own social-centric infrastructures onto the anomie of the urban fabrics designed by figures of institutional authority. Others still have drawn attention to transport as not just a form of physical infrastructure, but an infrastructure of social relations on a micro-level, such as through the study of personal space on the London Underground (Koole, 2016).

What we heard

Our interviewees pointed to a need for openness in how social infrastructure is used, with different purposes permitting different groups to find relevancy and access, thus bringing them together. The re-purposing of infrastructure into social uses was also an important part of this theme. A striking perspective on multi-purpose social infrastructure came from Taiwan, where one interviewee described the social innovation arm of the government stated aim of 'plurality:

> *'We can take care of different people in taking care of diversities. So it's like an extension of a pluralistic society. Like we can say everyone can set their own space, initiate what they wanted to do and transcend the constraints of venue and time.'*

This demonstrates openness in how social infrastructure can be conceived at a high level, conceptual approach. Many of the interview findings discussed here present a more localised, individual case picture of how plurality is and is not achieved.

Third spaces and their multiple uses

Interviewees described particular places where different purposes were combined to enhance social infrastructure effects. For example, it was noted that in Europe, shopping centres which included local government space for arts exhibitions worked well, as this became a place for bringing together different people with different aims for being there. This can be seen as an example of 'third space' - one which is not the home and not the workplace. This was described as an important type of social infrastructure in our Belgian and Dutch interviews. These third spaces often brought together different purposes. One interviewee compared marketplaces and libraries:

"You go to the market to get your groceries, to get your fresh food, etc, and you go to the library to get your books. But at the same time, or maybe even more importantly, they do more than that. So they offer this space of chance encounter of social capital, of reducing loneliness. So that's what those two spaces, I think, have in common. So, I'm interested in those kinds of spaces in the city that provide more than just access to certain goods, but that at the same time do something meaningful for society."

This combination of access to goods and social purpose demonstrates how thinking openly about the purpose of different places can help us better understand their social infrastructure role. Outside of commercial, or goods-oriented places, community centres and public libraries were also described by many interviewees as effective social infrastructure precisely through their openness in purpose.

In the case of community centres, these could have 'multifunctional use so that [they] are the places where groups can have a bingo evening or cards or something like that, or maybe more creative things.' In the Netherlands this multifunctionality was supported through different employees being made available to the community at the centre, including youth workers, professional development facilitators, etc. It was also seen as important that these practical aspects were balanced with arts and social activities: 'it's a combination of more formal activities and informal activities'. This openness in purpose, combining levels of formality, allowed for a range of people from different backgrounds and ages to find a use for the community centre.

Libraries were also described as multi-purpose spaces, and this was linked by interviewees to the wide diversity of those who used them. As in the case of community centres, the need for library staff to be able to meet the different needs of library users was emphasised. The standout case of public libraries as highly functioning social infrastructure was in Ohio, where multiple interviewees independently raised the public library system as exemplary: 'the library is sort of an outlier. In terms of just a well-funded, highly functional, very inclusive system'. This was attributed to a fixed percentage of tax revenue being committed to the libraries, which ensured parity in library provision across regions within the state. One Ohioan interviewee described 'the whole gamut' of difference the public library made in people's lives, listing examples including services for immigrants learning English; upskilling; children's activities; maker spaces; and even a 'books and beer' night in partnership with a local brewery.

Multi-purposes spaces and adaptability

Openness in the purpose of social infrastructure was linked to its capacity to operate across different scales. An example of this was given by an Australian interviewee who described how small settlements would have a pub or church, and due to the small size of the town these would be multi-purpose venues as there was nowhere else to meet different purposes. As these small settlements grew, they became absorbed into suburbia, and the social infrastructure within that suburban context, often provided by the state, became more formalised. Maintaining those original, informal,

multi-purpose social infrastructure sites was seen as advantageous. As one interviewee put it: 'I think maybe the spaces that are less highly programmed are the ones that actually work better, where there is room for appropriation.'

In some cases, social infrastructure was described as having one core or stated purpose, but being used in different ways to extend well beyond this. For example, In Ohio, schools had a foundational educational purpose but with many other social infrastructure uses added on.

> *"I am very agnostic in terms of the spaces where services are provided […] And so one area of opportunity that we see is providing behavioural mental health services, in the school buildings, where the children are getting to school every day, through school bus or through other means […] So there could be services that you know, all children receive, you know, which could be just basic awareness about their own behavioural health, and also education around you know, making good health choices, or those self-help or help-seeking behaviours and skills that I think a lot of a lot of children need."*

In this case, the extension of the school's purpose is actively managed, with organisations seeking funding and partnerships, for example through health insurance, to provide these additional services. In contrast to this active thinking about extending the purpose of existing social infrastructure, some infrastructures were described as being inherently more open in purpose. For example, community gardens and allotments in both the Dutch and Australian context were seen as spaces where diverse people could be creative, and could socialise, as well as gardening. However, there were also striking differences in the degrees of openness in different gardens and allotment sites, with some having highly restrictive rules and regulations that dictate how they can be used, while others are more open and anarchic. One interviewee, from Australia, commented:

> *"I think it's about ownership and allowing people to be in that space. If you think about community gardens, often the model is gated, and certain people can use it [at] certain times. So there's already a lack of trust in them."*

In order to be open to different purposes, allotments and community gardens must trust their users. Our interviewees described this as requiring a delicate balance of sufficient regulation to maintain the space and keep it safe, but with sufficient openness to allow for different approaches and uses. A similar balance was described in Taiwanese makerspaces, where different purposes included education, creativity, and very pragmatic access to resources for making needed items.

The makerspace in Taipei City was described as highly diverse in uptake among different age groups. Further emphasising the need for a balance between openness and control over a social infrastructure space, our interviewee noted that “it’s really important to identify who is, who is not suitable for this kind of space. Because one person can harm the whole community.” In this case, the interviewee advocated for education of infrastructure users as key to maintaining this balance. Additionally, to ensure the space has a social dimension beyond the purpose of making things, the interviewee noted a need to sometimes “make people talk or at least share what they’re doing’, suggesting that openness can require active pressure to ‘keep the community atmosphere”.

Finally, some interviewees discussed a more covert, multi-purpose nature of social infrastructure. For example, in the Netherlands ‘camouflage courses’ were held at the public library. These were advertised as serving the purpose of teaching something such as photography, but the covert purpose was to bring people together to reduce loneliness. This was seen as a way of making the social purpose more accessible by reducing embarrassment or stigma.

In other cases, people found uses for other kinds of spaces which had different original purposes, such as shopping centres, which may never have been intended as social infrastructure. An interviewee in the Netherlands gave an example of elderly people going “to a construction site where they would sit on the bench and look at, you know, the construction happening.” In these instances, the openness in the purpose is not designed, but rather revealed, by the users.

Changing purposes over time and culture

Openness in the use of social infrastructure can also be seen in how it can be adapted over time. For example, a Belgian architecture scholar, Janina Gosseye, who is now based in Netherlands and has spent time in Australia, drew from her research into European architectural history. She noted that swimming pools originally served a public health purpose, with a shift after the Second World War to memorial pools intended to help recovery from trauma and "linked to the fact that they were funded by these war memorial kind of donations".

By contrast, modern day swimming pools may primarily have an athletic focus - but there is also increasing emphasis on mental health benefits. It may be interesting to consider the extent to which these different purpose shifts over time replace one another, or to what extent older purposes are maintained alongside the newer.

In addition to different purposes shifting over time within a culture, different cultural groups moving into an area over time can also see changes in social infrastructure purposes. For example, in Australia, historical waves of British and then Indian immigrants were described in an interview as valuing cricket pitches, while more recent Chinese immigrants do not typically play the game and therefore prefer to use the greens for different activities. As the interviewee noted, "you need to have an awareness of where and what you don't understand in order to be able to deal with trying to plan for the future in the best possible version."

What we read

Physical spaces adapting for social contact

In our review of the literature, we found examples of how social spaces had been adapted and created with different purposes driving their use over time. To draw out two examples, Sweden and Brussels, we can see how policy and use of space can interplay to allow different people to come together to use spaces in new ways.

One change in infrastructure connected to social life in Sweden relates to the prevalence of licensed premises. As Rothstein notes, 'there is no equivalent to the British pub, the German kneipe, or the French bistro in Sweden' (Rothstein, 2001, p. 226), likely due to strict historical restrictions. However, without any changes to legislation, there has been a radical increase in the number of licenced restaurants, driven by cultural change among Swedes in turn driving change in administrative practices. At the same time, there has been no accompanying increase in alcohol consumption, suggesting that these venues serve a social rather than merely a provisionary purpose.

For Rothstein, this amounts to an 'indicator of increased number of informal social contacts in Sweden' (Rothstein, 2001, p. 227). As physical spaces that enable social contacts, licensed restaurants fit well under the umbrella of social infrastructure, and may be a relevant factor in determining levels of Swedish social capital, although Rothstein here suggests further evidence would be needed to explore this connection. Exploration of licensed premises as forms of social infrastructure, alongside other social spaces - such as dance venues - may yield interesting insights.

A key aim of Flemish policymaking is to stimulate urban development towards sustainability and to make cities attractive and affordable to live in; where the city is seen as a main driver of innovation, generating solutions for social challenges (De Mulder, 2013). Many Brussels-Capital region interventions for example, which may relate to social infrastructure as physical places encouraging social interaction (Klinenberg, 2018b), are urban planning related and have led to major changes within the city. For example, a former main road in the city centre has been converted into a car-free and pedestrian-only zone. This had substantial positive effects on the local commercial areas and increased footfall. People are now able to use the space for social mixing and interaction, as well as for events (BXL, 2016; O'Sullivan, 2019).

Public libraries

Public libraries are frequently cited in terms of their positive social impacts, however concrete framing and measurement of the social role of public libraries is relatively rare. While case studies of public libraries can trace their social infrastructure role, this is not easy to document, as noted for example in a recent Dutch study (van Melik & Merry, 2021). One framing that has been applied in US and Australian contexts is through the lens of social capital (Cyr, 2019; Ferguson, 2012; Johnson, 2010), which offers a means of examining impact. In an international review utilising this framing, the presence of public libraries is correlated to the development of 'civic attitudes' and 'local identity' (Wojciechowska, 2021).

This connection, traced from physical libraries to social outcomes, provides an indication of a causal pathway between this form of social infrastructure and social capital. Furthermore, libraries were found to improve access to information and help integrate minority groups or socially excluded individuals (Wojciechowska, 2021); a finding that is widely supported in the broader international literature with emphasis placed on the need for, and needs of, public library staff to facilitate the social role of the physical library space (de Jager & Nassimbeni, 2007; Fisher et al., 2004; Hall, 2010; Harding, 2008; Julien & Hoffman, 2008), with these examples including US, Canadian and South African contexts.

The importance placed on library staff broadens the understanding of the library as social infrastructure from physical space, and into public and voluntary sector social infrastructure. Libraries are also associated with higher levels of community involvement, higher trust and higher interest in politics (Johnson, 2010), and through being 'inherently local in character' they can be contributors to local identity (Barclay, 2017). As communities have seen a shift from local to hyper-local modes resulting from the Covid-19 pandemic, the locality of social infrastructure such as public libraries is expected to be a critical factor in the pandemic recovery (The British Academy, 2021b).

2.2 Connectivity

Connectivity recurred as a theme in the interviews and literature, both in a physical manifestation and in a digital one. In some cases, it referred to the passive infrastructure that literally forms connections between different regions and different people, but it also took the form of active connection building undertaken by different people and groups.

For many, the terminology of social infrastructure is cast in terms of online social networks and digital platforms. In some quarters there has been a discourse that separates the digital from the physical, and weaves narratives of wholly digital social infrastructure futures. However, across our research we found again and again that discussion of digital social infrastructure was always also discussion of the physical realm. In both the literature and in our interviews, it was salient how access to digital infrastructures meant access to broadband internet infrastructure. Where we heard about communities achieving digital accomplishments (eg Colombian communities digitally archiving their own historical records), this rested on physical access, such as low cost and easy to use document scanners. Young people may be engaging socially and with their education online, but they sometimes have to do so in the local fast-food outlet.

It should also be noted here that, just as digital social infrastructure is physical infrastructure, it is also subject to the same constraints and interests as other forms of social infrastructure. When we talk about inclusivity, accessibility, connectivity, and other dimensions of social infrastructure, these apply to both the online and the physical spaces people use to come together.

What we heard

Social infrastructure was defined by many interviewees as the link between people and social structures. It was described as part of a causal web of connections that connect us to one another. In some cases, this connection is intangible–a feeling, a sense, or a relationship–but additionally, the need for physical connection to social infrastructure was also emphasised.

Connection in place and across places

The need for connectivity with social infrastructure was associated with place in some of our interviews, especially with rural places. This was often formulated with a focus on physical places, which enabled connectivity between people, as our Indonesian interviewee articulated:

> *"I will refer to social infrastructure as the soft and hard infrastructure. So the hard infrastructure can be for example a school or a community centre, things like that. And soft infrastructure for the social infrastructure is kind the social cohesion that can be built upon from that hard infrastructure."*

This frames social infrastructure in a way closely aligned with Putnam's definition of social capital. However, the physical dimension of social infrastructure was broadened by our interviewees into a wider understanding of its connective role. In Indonesia, not only was the school described as a site of social infrastructure, the transport that enabled students to attend that school was also understood as part of that, highlighted by its absence when students could face a journey of "15 kilometres, or 20 kilometres by foot".

In Ohio, this was similarly described in terms of the roads that very literally connect places, and in doing so connect people to social infrastructure, and more broadly the transportation network across the state:

> *"It's much more difficult to be a member of Ohio's rural poor, because if you're poor, in Columbus, or Cleveland, or one of our metropolitan areas, no matter how deficient it is, there's a public transportation system. Regardless of different budget cuts, you know, there's a park system, you might have a public school, the museums, and our centres for science and industries - they're going to have a free day. So if you're the struggling poor family who maybe can't afford to go to the Columbus Center of Science and Industry, well, you at least know on a somewhat regular basis you can go on that for free day. But when you're rural poor, there's not transportation infrastructure, there isn't the social infrastructure."*

In both these cases, we can see how an absence of connectivity to places impairs people from using these places to connect with others, and therefore this lack demonstrates the importance of social infrastructure connectivity. This was also the case for online connectivity – not only do physical transportation networks enable people to reach social infrastructure places, but connection to the internet can enable people from all different places to use digital social infrastructure.

Another form of connectivity in social infrastructure was seen in how centralised services could have local branches to connect specific communities into their social infrastructure offer. The value of these small local branches was seen when they were lost in the Netherlands' public library system:

> *"Those central libraries are beautiful, and they accommodate a certain public, but people from further away, they won't go there because they don't have the knowledge which bus to take. They don't have the money or they don't feel welcomed there because they offer another programme than the neighbourhood branch did."*

And to complement this, the strength of Ohio's public library system in providing parity across regions through a network of connected sites shows how links across place can strengthen them.

As the central and local public library example highlights, social infrastructures can be connected up across scales. However, at what scale they need to be connected is an open question, with mixed responses. On one hand, small scale connection to a local neighbourhood was valued, as this Dutch interviewee articulated:

> *"Some social infrastructures do need to be at the level of the neighbourhood. And then whether it's provided by the municipality or by volunteers, that doesn't really matter as long as it's close to people."*

This highlights how proximity provides connection to local people. By contrast however, other examples raised the potential for connectivity at larger scale, such as the Evergreen cooperative described in Ohio:

> *"Evergreen as a closed system has had really great impact on the people as part of that system. But what it hasn't done is actually influenced the broader operations of the city of Cleveland, if you will, or other things that are happening."*

This shows the limitations of small-scale operating without connection to influence the broader context.

Policy vignettes:

15-minute city - Paris, France

The '15-minute city' or 'Ville du quart d'heure' is an urban planning concept that puts people and their habits in the centre of planning processes. Developed by French-Colombian scientist Carlos Moreno, four key characteristics describe the 15-minute city: proximity in form of closeness, density, diversity, and ubiquity. The plan was presented by Mayor Anne Hidalgo in 2020 for Paris. The aim is to design cities in a way that gives people access to essential urban services within a 15-minute radius. The main goal is not to increase mobility but to improve connectivity and access.

Another interesting point about connection across scale was raised by a Californian interviewee describing Non Governmental Organisations (NGO) as uniquely able to span social infrastructure scales, by connecting local government to the grassroots, acting as a kind of 'community government'. This interviewee argued that NGOs "fill that gap, when they're allowed to, when they're given the power, when they're given the space", suggesting a special connectivity role. Our interviewee describing the role of NGOs in connecting the government to communities is also interesting, as in Taiwan we heard about a specific government office seeking to fulfil this connective role (discussed in the next section on community voice). This suggests connectivity between government and community to support social infrastructure is an area worth further research.

Policy vignettes:
Wellbeing Budget, New Zealand

New Zealand set up the first wellbeing budget in 2019 to tackle long-standing difficulties in diverse areas of social life, such as housing, poverty, and domestic violence (Jaquiery, 2022). The key wellbeing priorities, which have become key government objectives, are mental health, child wellbeing, improving the living conditions of the Māori populations, enhancing productivity, and increasing income and a green transition. In particular, social relations and individuals' social connectedness are highly important for wellbeing and mental health and promoting this over time (Ding et al., 2015; Saeri et al., 2018).

The improvements of these key areas are monitored via the Living Standard Framework (LSF). This is a measurement tool used to tailor policies towards improving wellbeing, including social connections, accessibility to culture, and 'environmental amenity' (ie, access to green space, forests, parks and recreational facilities). Hence, the wellbeing budget and accompanying LSF consider social infrastructure as places that may support health as well as spaces which are encouraging social interaction and connectivity (the New Zealand Treasury, 2021). Approaching all these dimensions by taking into account these in combination highlights the importance of connectivity for successful social infrastructure.

Social infrastructure as ecosystem glue

For many of our interviewees, the root purpose of social infrastructure was connectivity. They described social infrastructure in terms of ecosystems, implying a networked connected system. Social infrastructure was also described as 'glue' linking and holding together different actors and different services, as well as filling gaps. Social connection, inter-cultural connection, and communication were also emphasised in how interviewees described their understandings of social infrastructure. In this way, connectivity can be seen as a central purpose for all social infrastructure.

Additionally, online connectivity is also key for accessing digital social infrastructure. In Ohio, an interviewee described how "the pandemic really put a spotlight on the lack of broadband in our rural areas" with people using McDonalds and similar venues for wifi access, especially children doing online schoolwork. However, due to the mismatch in purpose, this was seen as "a terrible solution" because:

> *"it's not necessarily sustainable if you're in the business of selling hamburgers […] There's maybe a certain exhaustion fatigue setting in where, you know, I don't think corporate America necessarily sees its role as that part of the solution. But there were certainly stopgap efforts."*

In some ways this contrasts with the previous theme of openness, as here the McDonalds has one purpose (selling hamburgers) and is being used for another purpose (wifi access for rural communities), but this multi-functionality does not necessarily work well. Moreover, it is interesting to note that most cases of multi-purpose social infrastructure were not corporate (eg public libraries, community centres, markets), and therefore the limitations of corporations in providing social infrastructure may be an interesting avenue for further research.

Connection across time in social infrastructure was woven through many of our interview conversations. However, in one case this connection to time was most salient, and that was in considering the social infrastructures of cultures older than our own. An Australian researcher who has worked extensively with Aboriginal Australians commented:

> *"I feel if we're going to take social infrastructure properly, we need to incorporate the Global First Nation populations - really in Australia they are the longest living culture, so they had the longest living social infrastructure of all people […] If we're going to take [social infrastructure] seriously, we have to incorporate some of their knowledge into that because […] often we want to create something new and flashy, like […] digital technology. Yeah, it's important, but there's been social infrastructure that's been working really well for thousands of years that we don't engage in."*

This presents an important provocation for our research, which is predominantly contemporary or historically recent in focus.

What we read

Digitally connective social infrastructure

It is striking that our interviews linked digital connectivity strongly with the physical infrastructure that enables it (ie, connecting online for educational purposes was not separate from the venue within which that internet connection is made, be it a McDonalds, a library, or a private home). Looking at connectivity in the literature, we have selected South Korea as a strong example of both online and physical approaches to digital social infrastructure.

South Korea has actively developed public policy to close the digital divide, including framing the government itself as a user-friendly service provider with strong online infrastructure (Lee, 2003). Lee argues this has strengthened democratic engagement, with online activism translating into electoral outcomes. Strategic government investment in broadband infrastructure is seen as a key factor in South Korea's recovery from financial crises, and ongoing economic strength (Chung, 2015).

Furthermore, Lee (2003) argues that South Korean technological development transformed the post-war poverty stricken country into an innovative high tech economy, increased Korean communities' sense of self-efficacy, and that the new technologies 'become a convenient means to enrich the sense of belongingness' (Lee, 2003, p. 14). Lee describes a reciprocal relationship between community membership driving technology adoption, as community members encourage one another to use shared technologies, and technology-enabled community engagement with wider online networks. It is notable that Lee, writing in 2003, finds:

> *'Two out of three Koreans spend up to two hours a day on the web as a member of a community. Over five million members visit their community portal websites every day.' (Lee, 2003, p. 14).*

This occurs at a point in time prior to the widespread adoption of social media and the rise of 'Web 2.0' that marked a shift in the use of the internet towards primarily social, user-led activity (van Dijck, 2013). Thus, South Korean policy and investment in driving technology development and adoption, can be seen as supporting the social infrastructure role of these technologies, prior to this becoming a widespread phenomenon. It is interesting to compare this South Korean policy approach, especially the substantive investment in broadband and broader digital infrastructure across successive governments (Chung et al., 2022), to UK policy - which has seen broadband investment feature in party manifestos (Corbyn et al., 2019) but perceived as unrealistic (Wright & Elliott, 2019).

Lessons from history:
The mercurial promise of digital connectivity

Historians have increasingly emphasised the importance of digital culture in the development of social infrastructure across the last three decades. In the 1960s, in response to the rapid ascendance of communications technology, Melvin Webber advocated for the idea of 'community without propinquity'; ie, that communities could flourish even between people spread across a considerable distance (Webber, 1963). Benedict Anderson famously proposed that the experience of simultaneous news consumption, initiated by the printing press revolution during the Reformation, is key to the structuring and collective consciousness of nation states' 'imagined communities' (Anderson, 1983). Tim Berners-Lee, the founder of the World Wide Web, hoped that would 'help people work together' in a new, egalitarian, open-access, digital landscape (Berners-Lee, 2000).

The 1990s saw a boom in technological optimism, particularly among Silicon Valley types (Barbrook & Cameron, 1996), but also amongst activist groups like the Zapatistas and Critical Art Ensemble, who hailed the digital as a brave new world for social empowerment, solidarity, and exchange (Critical Art Ensemble, 1996; Wolfson, 2014). Various academics have argued that the digital turn has invigorated a newly accessible and powerful public sphere for ordinary people to connect with one another and advocate for their interests (Castells, 2015; Zayani, 2015; Luger, 2021). However, others have cautioned that cyberspace ought not to be conceived necessarily nor straightforwardly as a communitarian site free from the obstacles faced in material space: the internet has increasingly become a commercialised, privatised, and surveilling space domineered by the leverage of capital (Curran et al., 2016; Zuboff, 2019). As a result, scholars have advised that our approach to developing progressive social infrastructures on the internet requires care, sensitivity, and regulation – rather than unqualified optimism – in order to harness new technologies most effectively for promoting wellbeing and social connection (Lovink, 2002; Barassi, 2015; Tarnoff, 2022).

2.3 Community voice

While there is a broader debate to be had around who is best placed to create, maintain, own and oversee social infrastructure (across national or local government, the private sector, or voluntary and community sector), within our review we have drawn out some thematic findings on how community voice can be heard by any of the actors, and its importance for effective social infrastructure. The inclusion of community voices was described as essential in designing passive infrastructure, and in enabling the active dimension through which different communities could adopt and use this infrastructure for social purposes.

Lessons from history:
Post-war appeals for participatory planning

The post-war period in the UK saw an enormous state-led investment in national reconstruction, following the physical destruction and social dislocation experienced in the Second World War. The country faced the pressures of a huge housing shortage; huge swathes of Britain's cities had been blitzed, and much of the ageing building stock which had survived was found to be inadequate by public health standards. The nation was also on the point of major socio-economic change, most notably with the growth of affluence on a new scale and the rise of the motor car, necessitating a radical restructuring of Britain's town centres (Saumarez Smith, 2019).

However, various countering voices arose in the 1960s out of frustration with the way that the country was being rebuilt – particularly with reference to the limited chances for the public to participate in urban planning. Internationally, the top-down nature of Western post-war urban renewal programmes were being critiqued from London to Berlin to New York to Toronto (Klemek, 2012). Jane Jacobs famously insisted that city planners were riding roughshod over the complex existing physical and social webs which made up cities' ecosystems (Jacobs, 2020). She proposed, 'A most intricate and successful organism of economic mutual support and social mutual support has been destroyed by [this] process.'

In 1969, Sherry Arnstein's 'Ladder of Citizen Participation' was published in the Journal of the American Planning Association (Arnstein, 1969), sketching out the different rungs of consultation involved in a meaningful participatory planning process. In Britain, in the same year, the Skeffington Committee published their report 'People and Planning', which made tentative pushes in favour of better involving the public in redevelopment plans (Skeffington, 1969). Grassroots community action advocating for more radical forms of participatory planning exploded around the 1970s, with major campaigns in Covent Garden, Notting Hill, Leeds, and Birmingham (Anson, 1981; O'Malley, 1977; Ellis, 2015; Matrix Feminist Design Co-operative, 2022). The 'community architecture' movement gained support from both the left and the right in its skewering of rigidly managerial planning methodologies (Hatch, 1984; Towers, 1995). Certain innovative architects, including Ralph Erskine, Walter Segal, Colin Ward, Rod Hackney and Peter Cook, came to emphasise the importance of users' and inhabitants' agency in the design of their built environments (Ward, 1976; Hughes and Sadler, 2007; Sadler, 2005; Grahame, 2021).

What we heard

To create good social infrastructure, our interviewees frequently emphasised the need for participatory approaches in the design of different places. They drew attention to the importance of including different voices, from different groups, to facilitate inclusivity in social infrastructures. The difficulties in this were also acknowledged, and ways of scaling participatory approaches were discussed.

Policy vignettes:

Civic participation in Brussels

The city of Brussels aims at increased civic participation in public matters to enhance the visibility, understanding and quality of policies and the related implementation. Participation is defined on the one hand as the collective processes of informing, listening and discussing policies, and on the other hand as the civic process that can serve as a consultation tool to inform policy focus and development (BXL, 2022).

The 'Brussels Participation' office, for example, hosts the digital platform 'faireBXLsamen', which facilitates the organisation of civic participation for issues such as the public investment strategies for the different neighbourhoods or providing information on how to receive support for public engagement (Brussels Participate, 2022). These efforts increase both transparency and collective engagement in public concerns, and strengthen the relationship between citizens and policy implementation.

Intersecting communities

In Australia, this need for participatory decision-making was described for different regions. For instance, in places with social challenges, such as towns where mining communities and Aboriginal communities intersect, "there's all sorts of complexities around those communities themselves and how they interact with that space". In order, therefore, to create any form of well-functioning social infrastructure in these places, all the different communities within the place need to be involved. As one interviewee said:

> *"I think if you're working through a really strong process, you bring community along [as] stakeholders, everybody's got ownership, everybody's part of that journey, part of the decision making, and part of the implementation part of the operation and give an agency to use the space as they would like to, generally we've got a better chance of success."*

It was noted that these community engagement processes have been highly successful in Australia, and are far more prevalent there than in countries such as the USA. In the American context we heard advocacy for designing places with community input as a means of obtaining better outcomes for social infrastructure (eg, where to best locate seating in a park, or where shade trees are needed, etc.). Indeed, in California we heard:

> *"I think the biggest thing that local governments can do policy-wise, ordinance-wise, whatever the case, whatever statutory documents they have, is to include the community as an ally, not as somebody that is to be governed, somebody that is to be controlled, or put in a box, if I could loosely put it that way."*

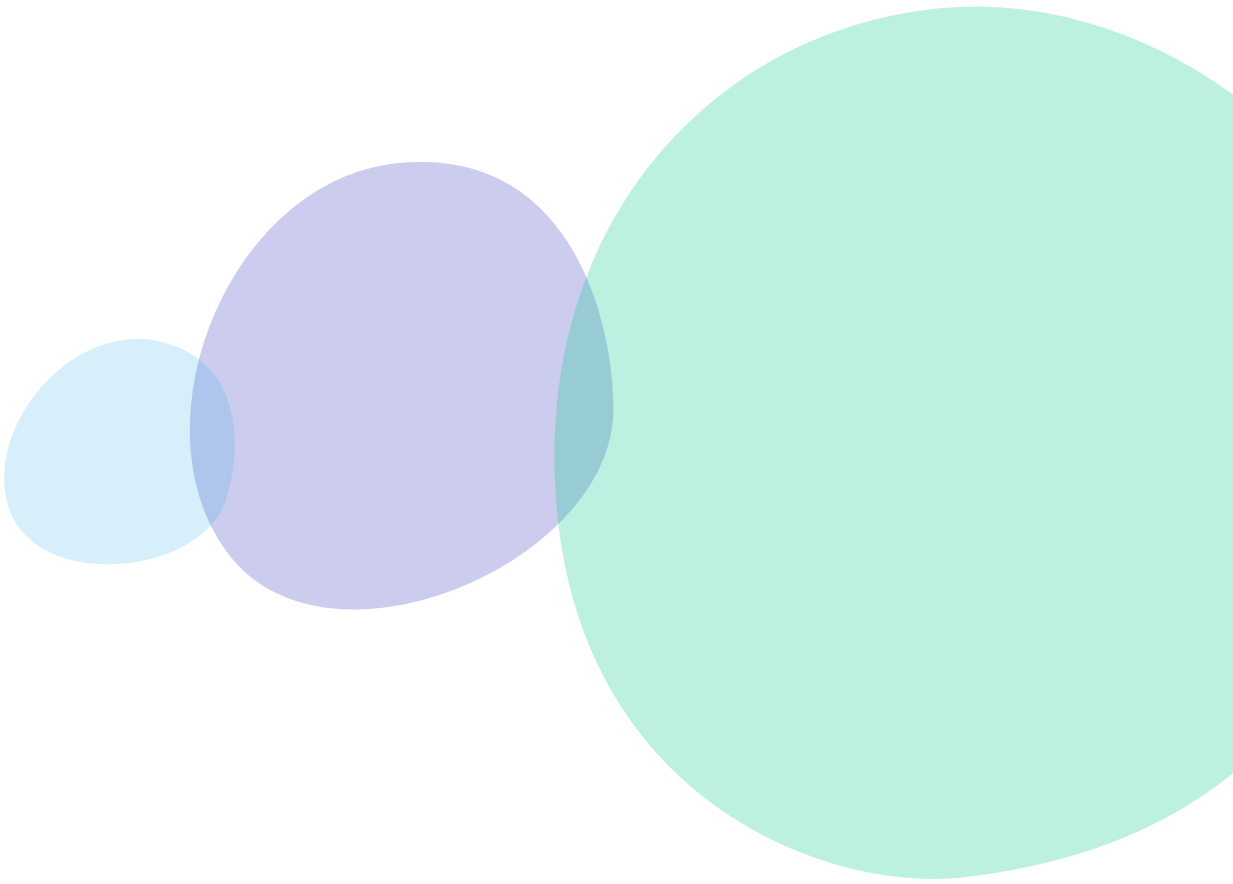
Local through to national community participation

The need to involve local people in shaping specific places inherently implies a small, localised scale for community participation in social infrastructure design. Indeed, the quote above places an emphasis on local government level when advocating for community involvement. However, the processes by which communities are involved can be translated across locations and thereby scaled.

In Australia, participants described success with "the loopback design process" across different social infrastructure developments across different regions. However, while the procedure is scalable, the actual participation is always conducted at a relatively small local level.

By contrast, in Taiwan the government's use of 'Participation Officers' demonstrates how communities can be engaged in decision-making not only at the local, but also at regional and national levels. An interviewee described the role of Participation Officers as the "bridge between governments and citizens", acting as a form of social infrastructure. Initiatives supported in this way include an online platform for people to influence policy ideas. For example, following one citizen's proposal to ban the use of plastic straws, which had gained support online, the Participation Offer facilitated meetings with different stakeholders with different views and backgrounds, until finally consensus was reached and the policy was adopted.

It is interesting to note that this Taiwanese approach is very organised, with the government actively orchestrating participation in decision-making. By contrast, we heard from our Indonesian interviewee how the use of privately-run platforms such as WhatsApp formed a central part of the community's pandemic response, and that the government is adapting to and seeking to develop further the use of apps to build on this form of community participation at scale.



Policy vignettes:
Political participation in Taiwan

vTaiwan is an example of a political participation project which aims at increasing civic co-determination and political transparency via open consultation processes for the whole Taiwanese society. vTaiwan is an online and offline consultation initiative which brings together various stakeholders around political decision making, such as governmental representatives, scholars and experts, as well as business leaders and representatives from the civic domain, such as civic organisations and residents to debate national political decisions (vTaiwan, n.d.). The aim is to increase the legitimacy and effectiveness of these decisions. vTaiwan was designed to be a 'deliberative space and an open consultation process where citizens could engage in dialogue with the public and private sectors to reach rough consensus on issues in the public sphere and help government craft public policies' (Hsiao et al., 2018).

However, these participatory approaches to designing social infrastructure, or taking place within social infrastructure, can only function at scales within which consensus is possible. As an Ohioan interviewee noted, "building social infrastructure has to be predicated on, you know, building social consensus […] and I think that's been a real stumbling block for us" with reference to the deep political and social divisions in the contemporary American context. This difficulty with participatory decision making where consensus is not reached can be seen practically played out in Indonesia:

> *'Most of the local and international NGOs work with local communities with a participatory approach. Sometimes the national government also takes that participatory approach to build physical infrastructure, especially the communal kind, with local communities. But sometimes it is just a temporary project, and then the continuity or the outcome of these projects sometimes does not really impact the local community's wellbeing. Let's say they have built communal sanitation facilities for local communities, these facilities are abandoned, the local communities are not using them, and they prefer to [defecate] in the river. Because it's kind of more comfortable to them, and they can socialise.'*

This illustrates the vital importance of community voice in the longer term, with sustained engagement to ensure the social infrastructure meets a community's needs and continues to serve the purposes the community values.

Ownership

A crucial purpose for involving communities in decision-making around social infrastructure was described as ceding ownership of that infrastructure to the communities who will use it.

A lack of ownership was described as a primary barrier for use of social infrastructure across different contexts. For example, interviewees in the Netherlands described how a lack of feeling of ownership could lead to people avoiding the very community centres that had been set up to support them.

Ownership also entails navigating complexities across local to national governing bodies. This is described in the case of California's parks, where reconceptualising this ownership to centre the community had been advocated as a means of cutting through the bureaucratic complexity:

> *"In the California context, in the US context, it's really quite a complicated dynamic as to ownership. And then I think the other big question [is] what does ownership actually mean? Is this is my piece of land, therefore, I control everything that happens to it? Or have I purchased it […] for the benefit of others, in which case, […] I think there is a mandate upon them to ensure that people can go there safely, and it is policed appropriately and such. But as far as its use, and as far as the way it's maintained, you know, we're talking about aesthetics, we're talking about usability, we're talking about access, I think all of those things actually should involve people at the community level. So for example, in a local park, you'd be talking about the community that's immediately around."*

Where ownership could be facilitated through participatory design processes, we heard about success stories too:

> *"This is a town called Horse Creek, with a highly indigenous population, and a European population that were pastoralists and ranchers and such. This community engagement process brought those two factions of the community together. They worked together on the outcomes, they built the outcomes, and that created cohesion in the community."*

Such success stories demonstrate how shared ownership can fulfil community cohesion purposes. Furthermore, community input into deciding the purposes of social infrastructure was also called for, ie, a step back from community input into how a social infrastructure development could meet predetermined purposes. As described for the Netherlands:

> *"The municipality has to do two things. One, they have to think about what their requirements are from the beginning, the expectations should be clear, because that's something that sometimes goes wrong. So [they do not] create an atmosphere where participants think that they can influence, but they can't on all aspects. So that means that the municipality, or local government in this case, needs to be really clear about, okay, where are the boundaries. And then the second thing is they need to let go. So they need to trust that whatever happens within that space, where they created the boundaries for, is fine. And that's difficult. But you see, in cases where people will have been asked, from the beginning to think with the architects or the municipality, so really a co-creation from the beginning - that works better."*

Community voice can be included in social infrastructure design and implementation over different time spans. A Dutch interviewee described community engagement as a means of future-proofing social infrastructure, by including different perspectives to make it more likely the infrastructures will still have relevance "10, 20, 30 years down the track".

Expanding this future orientation further, in Mexico City, an interviewee described the Regenesis project, which has been running workshops since 2009, as a long-term participatory programme to engage people with managing watersheds. This has the aim of more regenerative ecological thinking: "We need to create the conversational drift", implying ongoing future extensive aims that may not be readily apparent in the present.

What we read

Reviewing the international literature for how community voice is included in social infrastructure decision making would be too broad for the purposes of this paper. Instead, we offer two different approaches highlighted as successful, in different ways. Firstly, Nordic voluntary associations, and secondly online government approaches.

Nordic voluntary associations bridging community and government

Nordic countries are sometimes held up as exceptional examples of successful public policy, with an array of Nordic models proposed for varied domains (Byrkjeflot et al., 2022). Indeed, Nordic social infrastructure is held up as exemplary in terms of health and welfare provision (Lister, 2009). Furthermore, a specific case has been made for Nordic countries bucking the trend of declining social capital described by Putnam (1995b) with respect to the USA (Andreasson, 2017; Rothstein, 2001; Torpe, 2003), with Nordic countries frequently ranked highest for social capital (eg, Saltkjel & Malmberg-Heimonen, 2014), and social trust (eg, Delhey & Newton, 2005).

Indeed, social trust has been termed 'the Nordic gold' (Andreasson, 2017) pointing to a narrative of Nordic exceptionalism. This raises the question of which key differences between the Nordic and other contexts are driving the different social capital or trust trends. Nordic voluntary associations are often pointed to as the key source of this strength (Andreasson, 2017; Götz et al., 2015; Henriksen et al., 2019, p. 20152015; Rothstein, 2001; Torpe, 2003). In fact, the right to membership of voluntary associations is written into the Swedish constitution (Möller, 2021). These voluntary associations include workers unions, consumers organisations, protest movements such as feminist groups, religious, environmental, educational, sports, and many others forms of organisation, and are discussed as unique to Nordic countries (Rothstein, 2001; Siisiäinen, 1999; Torpe, 2003; Wollebæk & Selle, 2003).

When seeking to derive learnings from these organisations which could be applied to the UK context, it is important to note differences from 'Anglo Saxon' conceptions of voluntary organisation (Rothstein, 2001, p. 212). Nordic voluntary associations are characterised as:

- organisations comprised of local branches, linked to national entities
- entailing a combination of protest aims, with self-help aims
- acting as sites of 'democratic and organisational training' (Rothstein, 2001, p. 212) or 'schools of democracy' (Torpe, 2003, p. 31)
- working collaboratively with policymakers, at local government and state levels (Rothstein, 2001; Siisiäinen, 1999; Torpe, 2003; Wollebæk & Selle, 2003).

The networked nature of these voluntary associations is seen as a key feature. Rothstein describes how networks of organisations form a movement, which can bring together diverse groups; for example, the labour movement including unions alongside tenants', consumers', pensioners' and other organisations (Rothstein, 2001, p. 212). Meanwhile, Torpe notes increasing networking:

> *'For instance, user networks in connection with public service institutions, stimulated by the democratisation of these institutions; networks in housing areas, many of which have associational traits; and job-related networks. All three areas emphasise communication and cooperation, both as discourse and in practice.' (Torpe, 2003, p. 36).*

This networked nature is argued to be facilitated by Nordic governance

structures, which enable direct interface between voluntary associations and policy makers, and which in and of themselves display participatory and networked traits. The networked nature of Nordic voluntary organisations thus plays out both in their external linkages with other organisations, but also in their internal operations and the ways in which communities comes together through their association membership:

> *'When interacting with individuals of diverse backgrounds, goals and preferences, each person is forced to moderate their own attitudes in order to create a lasting social contract in the different settings. Dense, overlapping and interlocking networks thus contribute to compromise and negotiation where there might otherwise be warring of factions and centrifugal, escalating conflict.' (Wollebæk & Selle, 2003, p. 71)*

This networking demonstrates the social capital implications of these associations, as both bonding and bridging is evident in their networks. As such, Nordic voluntary associations offer an interesting model of community and government interplay.

Online government

The transformative impact of digital innovation and development poses new questions and dimensions for the political realm. Although the way people share, search for, and use information has fundamentally changed due to the widespread use of information technologies, most governments have not engaged in substantial changes to governance approaches making use of these technologies.

However, while online government remains a relatively new concept, there have been experiments and initiatives aiming to contribute to increased access, participation and inclusion: 'Key innovations of eGOV are: a global access point to enter different governmental services and information at distinct levels of public administration and with different devices' (Wimmer, 2002, p. 92).

The new flexibility and accessibility stresses civic, active participation

in government and democracy and therefore providing and facilitating elementary social infrastructure. This can be seen coalescing under the umbrella of 'civic technology', eg, 'Civic Tech is an accessible means that allows local municipalities to increase efficiency and transparency in tandem with increasing youth civic engagement in their community' as their engagement is primarily undertaken via online means (Schroedel, 2020).

In addition to giving younger people a greater voice within their local setting, online government is also assumed to be more inclusive. Barriers to civic participation are often a lack of information. Making these however as accessible as possible irrespective of gender, age, race or income increases the opportunity and likelihood of civic engagement and communities to co-determine and co-create their local contexts. 'The opportunity to bring expertise to local issues and to implement projects in their community, with immediate and tangible impact on their daily lives - this process increases transparency and trust in the local government, helping strengthen local democracy in the long run' (Schroedel, 2020).

Policy vignettes:
e-Government in South Korea

South Korean technology policy expands to the way the government itself operates, with the country described as 'the world's top digital government leader' (Chung et al., 2022, p. 2). Following the pandemic, the South Korean government is implementing policy to strengthen online government provision, including the aim:

'Creating collaborative and inclusive digital ecosystem [...] Promote collaboration between the public and private sectors to strengthen digital economy' (The Ministry of the Interior and Safety (MOIS), n.d.).

Furthermore, South Korean e-government policy includes 'establishing balanced social development' as a stated aim (Chung, 2015), and policy supporting informatisation is seen as a mechanism for improving quality of life (Chung et al., 2022). Therefore, the South Korean approach to e-government extends beyond the use of online platforms for bureaucracy, but appears to have social infrastructure aims in some of the digital government infrastructure.

2.4 Connecting with the natural world

Across our review of the literature and our conversations with interviewees, we heard about the importance of the natural world for social infrastructure. Green and blue spaces were described as physical, passive infrastructure that people could use for social purposes, but there was also an active socially collaborative dimension when it came to establishing and protecting these places. While wellbeing and public health may be the key purposes for which green and blue spaces are advocated in the literature, in our interviews the inter-cultural connective uses of natural spaces were more prominent.

What we heard

Our interviewees described the ways in which people connect with the natural world as an example of social infrastructure which is foundational, spanning regions and cultures. While there were differences between urban and rural contexts in the forms of natural environment described and the ways it could be used socially, the role that social infrastructure plays in connecting people with the natural world crosses these divides.

We heard how different communities from different cultural backgrounds can have very different relationships with a natural environment, such a river, holding distinct histories and beliefs that connect them with this natural place. Coming to the river can entail very different meanings for different cultural groups, and yet once there the connection to the place helps these different people connect with each other.

Furthermore, we heard how social infrastructure should be thought of ecologically, as a kind of connective ‘glue’ that connects complex dynamics of different communities. The social infrastructure role of natural environments as generative of connectivity between different communities therefore presents an avenue for further research.

Our review of the interviews relating to the natural world has provided us with the insight that one of the conditions of social infrastructure is the way in which it can provide connections between people and their environment. While it can be tempting to argue that the whole of the

natural world is social infrastructure, we believe that our interviews have demonstrated that it is the connections that people can make with the natural world and the subsequent impact that this has on their outcomes that is of core importance.

Placing the interpersonal and intercultural connections made when using natural spaces at the heart of their value, the issue of exclusion and lack of access to green and blue spaces is made even more salient, as described in USA:

> *"There's exclusion from spaces depending upon which socio economic group you belong to, or which racial group you belong to. And you know, those problems that are created in those communities because of lack of infrastructure, lack of resources, lack of amenities, lack of things that make us human, these problems flow into other communities."*

This is important to keep in mind when considering the benefits of access to these environments, as that access is not always equitable, which connects this theme to the inclusion theme to be discussed later.

Authentic natural spaces and social action

Natural places, such as national parks and other green and blue environments which have not been designed or manicured by people, were identified in our interviews as a special and deeply valuable form of social infrastructure. These spaces were described as important for social activities such as hiking and camping, but also as having a deeper link to what it means to be human and to be connected to the natural world and one another; as such, there is a link between this theme and the connectivity theme discussed earlier.

Lessons from history:
National Parks and the right to roam

The UK has a long history of tension over the public right to access green space, given its heritage of concentrated land ownership. The first 'freedom to roam' bill was pitched (unsuccessfully) to Parliament in 1884. It was proposed by James Bryce, a Member of Parliament who believed in the principle of collective access to Britain's countryside and mountains. In 1932, various ramblers led 'mass trespassing' protests at Kinder Scout in the Peak District. After the Second World War, on the recommendation of the Hobhouse Committee, Clement Attlee's Labour government passed an Act of Parliament to establish National Parks in 1949. They would serve the joint purpose of protecting areas of natural beauty and opening up green space for public pleasure (Kelly, 2019). Lewis Silkin, the Minister for Town and Country Planning, affirmed, 'This is not just a Bill. It is a people's charter – a people's charter for the open air.' It was understood that opening up Britain's green spaces had crucial public health benefits, both for physical exercise and psychological relaxation.

However, there is still discontent over the enormous proportion of British land which is off limits to the public due to laws of trespass. In England, the Right to Roam movement has advocated mass public trespass in response to a context in which 92% of English land and 97% of English rivers are off limits to the public, as they remain in private ownership (Horton, 2022). The Countryside and Rights of Way Act, passed in 2000, gave a limited 'right to roam' over 8% of English land. The Right to Roam Campaign has called for this to be radically extended, emphasising the importance of access to green and blue space for social wellbeing.

In Australia, interviewees emphasised the importance of "connections to waterways into foreshores", as places where the natural landscape changes and prompts different kinds of activity and interactions. As one interviewee noted:

> *"If you look at the importance that the river plays - not only not only for a contemporary point of view as a form of recreation, but culturally, it's fundamental to the place and also connection to the to the water to the coast."*

Here we can see the way that natural environments support both physical and recreational activities, such as water sports, and also connect us to our cultural heritage, in this case, the Aboriginal people's histories and beliefs associated with the river. Drawing upon this, our Australian interviewees emphasised the need for "authentic" natural places, rather than creating artificial and highly managed parks. Where green and blue spaces were to be designed by humans, authenticity was still emphasised: "if you're going to do something truly authentic, it would at best mildly draw upon that cultural and ecological sort of background", again valuing cultural and natural integration.

In contrast to this Australian perspective, an interviewee in Mexico City highlighted the importance of natural places as social infrastructure in an urban context. In this case, in a densely populated highly built-up city, the emphasis was not on preserving the authenticity of natural places, but rather on finding ways to allow nature into the urban environment. This included the construction of wetlands in the city, which people could then use for both social and educational purposes. However, the creation of these places was argued to be not "just landscaping" but using social infrastructure to integrate the benefits of connection with the natural world into people's lives.

Finally, the example from Mexico City demonstrates the role that social infrastructure can play in connecting social action to natural places. In order to obtain funding and permission to convert urban areas into natural spaces, large numbers of people needed to mobilise together and so communities saw the creation of social capital. This chimes with our Californian interviewee's note that:

> *"Community groups are always going to have far more input, far more awareness of the layers of connectivity between the green space and their quality of life."*

Thus, the social action that arises around the development, use and protection of natural environments links this theme to both the theme of community voice, which we considered earlier, and the theme of social infrastructure as resistance to be discussed later. This points to the centrality of natural environments to help us understand social infrastructure.

Thinking across ecological scales

Understanding connections with the natural world as social infrastructure opens the concept up to a vast scale. As a Mexico City interviewee said:

> *"What I truly understand about social infrastructure, or social engagement in any way, shape, type or form, I believe it needs to be intimately tied to ecological understanding. And we really can't divide social development without ecological development."*

Ecological scales imply interconnection from any place, time, or purpose of social infrastructure, to a network of causal linkages. For example, in the Mexican context an interviewee described how the cleanliness of a river impacts all lives around it, and that using rivers for sewage misses "the economic and social development that comes along with clean rivers".

Thinking about the natural world as social infrastructure also invites differences in scale for how it can be used and by whom. In Australia, our interviewees discussed scales of accessibility. A small-scale form of access to the natural world (such as glamping) was seen as inadequately ambitious in capturing the social infrastructure potential of natural

environments. Rather, interviewees advocated for challenging how access can be given to wilderness at larger scale, including for different kinds of users, such as wheelchair users. They described a hiking trail grading system that could be scaled across all national parks to indicate difficulty and accessibility, but furthermore "we've turned 'class four' trials, which you're a real hiker to get into, to class one or class two, so you can actually push your wheelchair down them", demonstrating scaling ambition for accessibility to natural places. This also points to an important drive we heard across our interviews towards radical accessibility, challenging assumptions of who cannot, or will not, use spaces as social infrastructure, and pushing for equitable access at every opportunity.

The human use of natural environments

While the natural world was described as social infrastructure by our Australian interviewees, this was somewhat in tension with human purposes for natural spaces; our interviewees emphasised the purpose of natural places as not human-centric, in line with the need for their authenticity. Where human purposes needed to be designed for (such as providing accessibility), thinking beyond human purposes was advocated (eg, designing animal crossing points to roads). In order to provide the best social infrastructure, working with the natural world was seen to require thinking beyond the social purpose, so as to keep the environment real/authentic and not turn it into a kind of "Disneyland".

Another approach to combining human purpose with the natural world was described in Mexico City, where artistic purpose could span social infrastructure use and authenticity. By displaying artwork inspired by the natural world in a gallery, be that schoolchildren portraying what the wetlands mean to them or professional works of art depicting a local lake affected by climate change, interviewees described how a space such as a gallery could play the role of social infrastructure. The original natural place serves one purpose for the artists engaging with it, and then the works depicting it serve another purpose for their audience. In conjunction, these purposes connect people to the natural site and to one another.

Policy vignettes:

Mexican policies on green urban development

The city of Mérida developed a Municipal Green Infrastructure Plan as the first city in Mexico which strategically plans green spaces and urban treeing between 2018-2021. This has been used as a benchmark for other cities following the idea and implementation of measures to improve and increase green spaces in urban areas. The city of Coronel for example developed 'the Coronel 2050 Green Plan [of which the main objective] is to reverse the current downward trend in the situation of urban public space, progressively raising the index of green areas in each of the neighbourhoods. This is intended to be achieved through a management tool that guides and enables the construction, adaptation, recovery and protection of green spaces through the application of comprehensive, simple and orderly methodologies that aim to generate links of association and teamwork between various actors in society' (Ciudades Verdes, 2012, 2016).

Tourism formed another purpose for the natural world described as social infrastructure, and here attitudes were somewhat conflicted. In Mexico, regenerative tourism was described, with tourists able to visit remote parts of forest on communally-owned land, supporting the local people: "these are families that have safeguarded these forests for the last 700 years." The implication is that tourism can bring together different people and support care of the natural world.

By contrast, in Ohio the use of the natural world to support tourism was described as very distinct from how local people use the same natural places. This translated into the funding available, and scale of provision, for caring for these natural parks: "the local option with some funding pushed through the Department of Natural Resources, and then we have a state park system that's really seen as part of the tourist industry." This demonstrates how different purposes for the natural world can be associated with different people's needs.

In another example of the human use of natural environments, Belgian social investors were described as gaining access to the experience of a collective farm, as well as its financial returns, in a model that has been growing in popularity. One social enterprise investment manager commented:

> *"We've seen a lot of people investing in that collective farm, but they made the decisions as well to farm in an environmentally-friendly way. They would have a lot of different crops, not a single crop. And the participants can work in that cooperative enterprise as well, which helps [them] see it and the benefits. They invest in a new way of the culture, they participate in the whole flow of the company as well, which gives them a positive financial investment and a positive turnaround in agriculture, but also from social backgrounds, they participate and it gives them a good feeling as well."*

It should be noted this form of investment was also linked with tourism, as these investors were almost exclusively from urban environments and their experiences of the collective farm were not unlike those described in the Mexican regenerative tourism case. This provides a different perspective on a similar theme around how green environments (even if for human purposes) allow cultural interplay and development.

Finally, discussion of the connection with the natural world demonstrated a strong role for social infrastructure in combating the climate crisis. This was clearly heard in interviewees' discussions of urban greening, and was for example a strong motivator for the Belgian social investors. Reflecting on the impact of the Anthropocene, an Australian interviewee noted that the changing climate will change what people need in order to use urban places as social infrastructure, and this will require greening (eg, the role that trees play in providing shading in urban neighbourhoods). In the Netherlands, similar concerns led an interviewee to suggest that global heating will push "social legitimation", as well as policy legitimation, for urban greening initiatives such as guerrilla gardening and hence could provide a further driver for the creation of new social infrastructures; this will be discussed further under the resistance theme.

Policy vignettes:
The big Australian picture

In Australia, the Australian Infrastructure Plan (AIP) outlines the national infrastructure investment plan post-Covid and for the next 15 years. The 2021 plan is the first which does not only cover physical infrastructure concerns, but also acknowledges the role and importance of social infrastructure. The benefits of the provision of green and blue spaces are manifold, connecting with the natural environment supports mental and physical health.

Through appropriate investment in green and blue infrastructure and related recreational infrastructure this is a key dimension of the social infrastructure plan. The aims are to increase the understanding, valuation and good governance of environmental infrastructure and to encourage the use of these natural spaces. Plan Melbourne is a practical example of the overarching AIP, and emphasises the importance of urban green spaces for communities and as social infrastructure (Pozoukidou & Chatziyiannaki, 2021).

A key pillar of Plan Melbourne is the development of community gardens alongside green streets, playgrounds and parks and sport and recreation facilities. (Victoria State Government, 2016). 'Residents should be included in community landscaping and revegetation opportunities such as community gardens, vegetable patches, play areas for children and greening streetscapes with tree planting and nature strip gardens. Communities can also convert disused public land into parkland to green their neighbourhoods and increase public open space.' (Victoria State Government, 2016, p. 103).

All this also serves a safety related aspect of risk mitigation in case of extreme weather such as floods and erosion. Green and blue spaces may serve these needs and complementary as well as space, habitat and recreational infrastructure at the same time (Australian Government, 2021).

What we read

There is a vast body of literature connecting green and blue spaces with social connection and wellbeing in ways that highlight its social infrastructure role. Putnam (1995a) links green spaces to positive social outcomes such as increased education and health, and decreased poverty, unemployment, crime, and drug abuse. The association between green spaces and wellbeing is strongly evidenced across international literature, (Bedimo-Rung et al., 2005; Kaczynski & Henderson, 2007; Pritchard et al., 2020). Furthermore, positive associations between green space and mental health are well-established (Bolund & Hunhammar, 1999; Spano et al., 2020; Sturm & Cohen, 2014; Bennett Institute for Public Policy, 2020).

When it comes to green and blue spaces for wellbeing, we can also see approaches adopted across cultures, as in the case of 'forest bathing' as a practice originating in Japan and increasing in popularity internationally with recognition of its positive mental health effects (Kotera et al., 2022). Furthermore, green spaces within global urban landscapes are associated with access to, and building of, social relationships and social identities (Burgess et al., 1988, 1988; Gehl, 1987; Lloyd et al., 2008; Rabare et al., 2009). Community use of green spaces, such as community gardens, offers insight into links from the social infrastructure of the green space to the development of social capital:

> *'The outcome of the collective action extends beyond the garden project itself, to increased civic engagement, because individuals have to become involved with planning and legal authorities… In addition, the activities can increase personal access to social capital through the use of social networks and access to new skills or education and change individuals' sense of identity.' (Gross, 2018, p. 80)*

Here, we can see the physical green space also associated with public services, and thus playing a potential linking social capital role between communities and authorities, in addition to a bonding role via networking. It has been argued that community gardens could be a means to enhance the generation of social capital in urban contexts by bonding, bridging and linking social capital (Kingsley et al., 2020). The role of green spaces as 'natural capital' has also been foregrounded in recent literature, and forms

an important framing for understanding their role in communities (Bennett Institute for Public Policy, 2019).

In summary, we can see how natural spaces can be a form of physical infrastructure that has social uses, but their role as social infrastructure goes far deeper, offering unique sites of connectivity, wellbeing, and intercultural interplay.

2.5 Social infrastructure as resistance

In our review of the literature, we found social infrastructure linked to protest and direct action. Inadequate infrastructure is cited as a motivating factor for protest, and protesters used and created social infrastructure to support their aims. However, in our interviews this framing was broadened into other forms of resistance beyond protest, and as such we see a complex picture emerging of how people respond to and use social infrastructure in responding to and opposing circumstances they feel need change. In particular, we see passive infrastructure repurposed for active protest (eg, legislature buildings occupied) but predominantly it is the active, social dimension of social infrastructure that comes to the fore in resistance as people organise in opposition to the contextual factors motivating them to drive change.

Lessons from history:
The role of protest movements

The Police, Crime, Sentencing and Courts Act of 2022 has extended restrictions on public protest in the UK. It grants police forces new powers over the authorisation, character, and timing of protests. The state accordingly has the capacity to deem whether they are 'acceptable' or 'unacceptable', enshrining 'public nuisance' as a criminal offence. This Act has attracted controversy from human rights groups, given the significant threat this statute presents to freedom of political expression.

Historically, protest movements have acted as the basis for the development of important social infrastructures and bonds of solidarity in the UK. The squatting movement, which emerged at the end of the 1960s and blossomed in the 1970s in reaction to an acute housing crisis, allowed for precariously housed people to build up new infrastructures of mutual aid via direct action. These structures of cooperative support were of particular value for vulnerable people: historians have pointed out how LGBTQ+ people could form new familial households and domestic intimacies via squatting (Cook, 2013; Wall, 2017). Yet, others have pointed out divisions between squatters who were part of 'traditional' nuclear families within the Family Squatters' Advisory Service, who were frequently treated more sympathetically, than those who were single, students, unemployed, queer, or used drugs (Tallis Milligan, 2016; Davis, 2017).

What we heard

In the themes considered so far, social infrastructure was typically designed and used proactively for different purposes and towards various ends. Under this theme, we look at examples of reactive social infrastructure, which has been designed or used in response to issues, often felt negatively, that affect different communities.

Reaction to infrastructure design

In our interviews, we heard examples of places designed to garner a reaction which, as a result, can be said to function as social infrastructure. For example, in Australia a university campus featured staircases that were deliberately too narrow so as to prompt people to bump into each other, in the hope this would create greater social interaction. However, this form of social engineering in social infrastructure design was by and large seen as unsuccessful when taking a historical perspective across such initiatives.

By contrast, in some places, social responses arose naturally that fostered social interaction through unintentionally poor design. For instance, privately operated buses in Mexico City have poor or no mapping, and lack timetables. This brought people together to share information and determine which buses were going where and when.

In a similar vein, as briefly mentioned in the natural world theme, guerrilla gardening was described as a response to a lack of urban greenery in both the Netherlands and Australia. In both of these examples, interviewees discussed a need to establish support for the ways in which people were reacting. In the Mexican case, the Laboratório Para La Ciudad held an initiative for young people to develop bus maps to make the social response to the poor infrastructure more consistent and more widely usable. In Australia, an interviewee discussed the role of policy to support guerrilla gardening:

> *"That makes it very easy for the developer, once the areas have become gentrified, to take it back. So how do you hold on to the environment that will be strong social infrastructure like community gardens when they do it in this way, they can become part of the community and not be taken away from the community. And you need policies and consistent guidelines around that, at all levels of society."*

Thus, while these forms of social infrastructure are developed reactively by communities in places where there is a lack or a problem to address, there is a case for broader support to make them work.

Policy vignettes:

Social infrastructure as protest in Barcelona

Barcelona's superblocks are an example of social infrastructure development in opposition to environmental factors (eg, busy roads, domination by commercial outlets). The superblocks in Barcelona are putting people at the centre of Barcelona's public space model. The concept transforms streets into so-called superblocks which promote social relations and local economy by redistributing public space from private transport vehicles back to the residents, from traffic to citizens.

Several superblocks will together form green axes throughout the city which will provide meeting areas, playgrounds and street furniture. These facilities shall impede a further takeover of private bars and terraces and promote generating local relationships in the local neighbourhood. Trees will be planted in order to create green hubs to support the inner-city climate, generate spaces to enable encounters and meeting spaces, calming the streets, to reduce pollution and improving air quality. The regained space is used for local commercial activity where visibility is increased as the higher comfort for pedestrians causes a higher footfall and success for the businesses (Ajuntament de Barcelona, 2022).

In Colombia, we heard about community actors coming together to find ways of replacing infrastructure (in this case, archival material) that the local or state government was unable or unwilling to sustain:

> *"Collections of people who are interested in local history often who, in some cases, have rescued these materials when they were going to be disposed of by government institutions who didn't want them. So, some of them are quite old, some of them go back to the 1920s, and in various places there were sort of cleanouts of storage rooms and stuff was dumped - in one case in a river. So there was a lot of mistrust in sort of handing this over to the state for the state to then to neglect it."*

This prompted a community digitisation effort, supported by the development of low-cost and easy-to-use technology, to preserve these historical materials. This not only demonstrates collective action in the face of poor infrastructure, but the development of a social infrastructure that is changing how archiving can take place, "that also involves sort of thinking with communities and stakeholders about who gets to decide what cultural patrimony is, who gets to decide what should be preserved, what should be digitised". This then feeds into broader opposition to the way that cultural information is held and disseminated, including in education. A Colombian researcher working with community archives noted:

> *"Most of the way history has been taught in classrooms, in places like Colombia, it comes from research done from other places, and by people that's writing in other places that has nothing to do with local real scenarios with the history of that particular place. And so it's important to start empowering people to show them the places they're living in are important. They have their own history, they have the documents that are there, they're showing how things were in the past in those specific locales. And where you are in small places in Latin America, it's frequent to hear a lot about the great European heroes or the presidents and big figures from the United States - but it's less frequent to hear what the, about the local historical processes."*

Social infrastructure linking people to wider movements

Reactive social infrastructure was typically described as inherently localised, given that it addressed a specific need or deficiency. However, in some cases local approaches drew from broader, larger-scale movements. For example, in Mexico City an interviewee described applying the approach of the global Occupy protest movement to a small-scale action in Mexico City to push a local administration to allow park development. This was described as a small-scale local expression of a bigger "tactical urbanism" movement.

Our interviewees in Ohio described how shared purpose in reaction to social issues could drive very strong cohesion among some groups. Here, it was pro-gun groups and anti-abortion groups, among other cases of right-wing mobilisation, that had created successful alternative social infrastructure to support their social networks, building social capital through which they could advance their causes. These networks can be seen as examples of connective social infrastructure, as discussed in the next section. As described by an interviewee:

> *"And one could say actual social infrastructure, I would say not a positive trend, is on the extreme right in the United States. The people that tried to overthrow the government … that is very close-knit social infrastructure, people who feel they don't have a stake in the overall system that the system represents the interests of special interests, however defined. And so they're banding together in this way, so in a sense, I think social infrastructure, it's not necessarily just a complete positive."*

This demonstrates how social infrastructure can be developed in reaction to social and political conditions, in directions the mainstream majority may find alarming. Furthermore, within the same US context, we heard how opposition can drive approaches to social infrastructure between states:

> *"I don't think that California is looking to other countries as an example for models because Californians like to think that they know everything. But I think the primary influence that Californians get is they look at other states in this country. And they see the oppression and they see the anti-socialist ways that things are done. And that's not who Californians are. So, simply by looking further afield at the negative things that are happening, Californians then realise 'Well, that's not the way we want to live'. So we need to do things differently. And this is how we do it."*

We also heard about reactive social infrastructure on the other side of the political divide in Ohio, in response to the decision of the US Supreme Court that the Constitution of the United States did not confer a right to abortion:

> *"Ohio is one of the states that now has a ban on abortion after six weeks. This is just horrific […] So we're thinking about, you know, if this is the situation that this is the case - the reality they want us to live in - what are we doing to respect children's rights and the health of the mother and the child? Right, once that child is born, so we're trying to figure out how to use this to expand healthcare, expand childcare, expand family, paid leave, you know, all these other things. You know, we're in a forced birth situation, basically."*

This interviewee's description shows how the loss of reproductive rights in the state is prompting people to come together reactively around the purpose of helping to provide the care required. A similar case of meeting needs was also made of how food banks act as social infrastructure, although these were described as buckling under pressure and unable to fully meet demand. Taken together, this paints a complex picture of within-state, between-state, and national-level social infrastructure use and development, in reaction and opposition to social and political context.

Another case of social infrastructure in reaction to negative conditions can be seen in trade unions organising around poor employment practices. Again, this has been an important form of social infrastructure in the USA, and in Ohio we heard about modern labour organising driven by contemporary employment conditions:

> *"You have major large scale employers and rural areas where some of this is coalescing around what people refer to as the New Union Movement, this young generation of like wild cat strike type organising, that's outside of the structures of traditional labour organising […] I think there is promotion of connectivity, social cohesion, that's happening because these large employers are just so large at this point."*

However, it should also be noted that while trade unions have a reactive purpose, they also have a proactive social infrastructure purpose as described by another Ohioan interviewee:

> *"You look in their early stages in the United States of the trade union movement, the unions were intentionally building culture with the workers, and that empowered them forth."*

What we read

In our review of the literature, we focused on France and Taiwan for examples that highlight different relationships between social infrastructure and protest movements. In France, the mobilisation patrimonales (heritage mobilisation) and the development of maisons de quartier (neighbourhood houses) led to new associative and social links (Ion, Micoud, Niez, 1979; Dagnaud, 1979). Subsequently, urban spaces have been the initial focus of these political interventions and policies that addressed spaces as an instrument to support social infrastructure in France (Vermeesch, 2006).

A recent publication by Algan, Malgouyres, and Senilk (2020) found evidence of a link between the loss of public services and infrastructures such as shops, libraries, cultural centres or health services, and places of sociability such as bars, cafés and sport centres, alongside a loss of well-being among citizens, and political discontent:

> *'The loss of places of socialisation seems to contribute to the discontent of territories mobilised during the Gilets Jaunes movement. On the contrary, when local associative networks are dense, manifestations of discontent are rarer.' (Algan et. al, 2020)*

It has been argued that the Gilets Jaunes protest movement was driven by a striving towards 'commoning', or the building of community, which motivates participation from a broad cross section of society from youth to pensioners, from urban to rural (Susser, 2020). It should be noted that the Gilets Jaunes movement also has an online dimension, and that digital infrastructure serves at least in part as a type of social infrastructure to bring together communities into the movement (Chernov et al., 2019).

Arguably, the Gilets Jaunes brought the desire of community, and the infrastructures that can enable it, to the fore in French society and thus served as a justification for different political programmes such as the Action Cœur de Villes, Petites Villes de Demain and Maisons France Service. The UK may not have seen movements such as the Gilets Jaunes to date, but the Levelling Up White Paper is arguably seeking to address similar sources of community discontent.

The development of vTaiwan, discussed earlier in this report, was at least in part motivated by the protest Sunflower Movement (Hsiao et al., 2018), which saw student and civic groups coming together to occupy the Taiwanese legislature and debate issues around trade with and political pressures from China; a movement that was partly facilitated through online interaction (Ho, 2018). Thus, we can see online infrastructures as social infrastructure enabling political engagement in these cases (whether resulting in protest, or in participatory policy deliberation).

The Sunflower Movement has been described as a case of 'decentralised decision-making [...] as a means to a clearly defined and consensual movement goal' (Ho, 2018), which is mirrored in the design of vTaiwan, and can be called an expression of 'adhocracy' (Hsiao et al., 2018). Both the Sunflower Movement and vTaiwan have resulted in effective change; the former in triggering political change in Taiwan, and the latter in concrete forms of decision making.

For example, vTaiwan engaged communities in Taipei City in deciding how Uber should be regulated, and this resulted in new regulation being adopted which included all of the consensus items derived from the online participatory process (Ministry of Communications, 2021). As the Sunflower Movement and vTaiwan utilise digital infrastructure alongside physical spaces to bring communities together, this infrastructure can be seen as social infrastructure.

2.6 Inclusion of some is exclusion of others

While inclusivity featured as a key aim for the development and use of social infrastructure across the literature we reviewed and interviewees we spoke to, this was not without complexity. A clear tension emerged between who is included and who is excluded from any social infrastructure. This is a tension to which there is no simple solution, but which is a crucial lens to be applied in any analysis of any social infrastructure approach. Within this theme, we also see a clear need for active inclusion, driven by people coming together to push for greater accessibility and inclusivity, as well as for greater provision of passive spaces that can be used by different groups.

Lessons from history:
Issues around the privatisation of space

Academics have noted that the cultivation of public health, wellbeing, and pride of place has been increasingly threatened by the privatisation of public space in Britain over the last 40 years (Spencer, 2016). In urban contexts, third-wave gentrification has become an apparently inexorable force since the millennium (Hackworth & Smith, 2001), causing exponential hikes in the cost of housing and an exclusionary annexation of public space which marginalises former communities without sufficient financial capital to remain in their neighbourhoods, worsened further by austerity (Lees, 2014; Lindner & Sandoval, 2021).

This drift towards a mass privatisation of space risks a scenario in which a country becomes constituted of a host of 'non-places', a term coined by Marc Augé (1995) to describe the development of anodyne spaces of anonymity, transience, consumption, and alienation – places like hypermarkets, airports, highways, shopping centres and hotels that are characterised by a raft of bodies passing through without any connection, creating veritable 'ordeals of solitude' for people confronted by them.

A key function ascribed to social infrastructure across our research has been its capacity to bring together different kinds of people, from different groups and backgrounds, who might otherwise never meet and engage with one another. However, in every case where social infrastructure can accomplish this for some people, we find the crucial caveat that it cannot encompass everyone. When we advocate for social infrastructure inclusivity, we must always ask who is being excluded.

What we heard

Our interviewees emphasised the value of social infrastructure that brings together people from different groups, but also highlighted limitations in the extent to which this can be done. When asked for positive examples of social infrastructure, interviewees often problematised them as well as praising them, to make it clear that the provision of infrastructure should not be seen as a simplistic solution to complex problems. In one example from the Netherlands, we heard about local elderly white people avoiding a community centre that was used by young migrant youth because “they didn’t want to be in this heterogeneous environment”. Here, the young people from migrant backgrounds had been welcomed and included but this inclusivity had resulted in the exclusion of the white elderly community whose attitudes preclude their shared use of the space.

Such intergenerational exclusion within social infrastructure is raised elsewhere in our review as different countries adapt to ageing populations, but the wider social impacts remain to be seen. In this instance, we may adopt an anti-racist framework and prioritise the inclusion of those who have suffered racism, over those who may have perpetrated it. However, as we discuss elsewhere, the adoption of different frameworks from which we may derive decisions on whose inclusion in social infrastructure to prioritise requires deeper analysis.

Diverse spaces and intercultural tensions

The Netherlands example is about intercultural tensions as much as it is about intergenerational exclusion. Another example of such tensions comes from Australia and relates to a particular tree in a mining town with shade and good sightlines that was valued by Aboriginal people who gathered under it; subsequently the local government sought to cut the tree down precisely to prevent these gatherings. A less dramatic but equally instructive example from Australia relates to the use and abuse of community gardens:

> *"Anything that seems positive, like a community garden can also be negative, because it's excluding someone. All right. But there will be people who vandalise it because they don't like it. There's something about it, they don't like, that's not creating a social environment for them. […] So I think every single element of social infrastructure you're going to find, we'll have people that fit in and love it, but will have an element of exclusion, where a group will come up and not like it."*

While community gardens and allotments were described by interviewees as strongly diverse and inclusive spaces, bringing together different cultural and age groups, it is also important to note that there remain some who experience exclusion from them. Furthermore, it may be that how a place is established as social infrastructure sets up inclusion of some and not others. This was described in Dutch community gardens, for example:

> *"It started with a few initiators, and those are in the lead, so they decide. And of course, some are more open to change. But you see that there's a kind of strong connection between the ones who decide and the ones who started."*

Larger is not always more inclusive

Differences in the scale of social infrastructure, and who is and is not included in it, was also raised in our interviews. In the case of local Dutch public libraries for example, these serve a small hyper-local clientele: 'it's a very loyal group but very limited group also'. Following the same line of reasoning, our Australian interviewees suggested larger scale infrastructure was needed to accommodate different needs:

> *"Sitting on the ground might suit people of all ages in an Aboriginal culture here in Western Australia, but maybe not anyone above 17 in with a Western sort of privileged background."*

Having a large enough park where both ground seating and bench seating is available was proposed as a way to address these different cultural preferences.

Conversely, an example of how greater scale can reduce inclusion was seen in Ohio, where large-scale enterprise funding offered openly for everyone to apply resulted in only large and well-established applicants succeeding:

> *"If there isn't the targeting of how the resources are used, if it's sort of the per capita allocation […] And then this has the sort of, unanticipated horrific outcome of actually furthering the disparity because, you're allowing, you know, communities that have a lot of capacity that have sufficiency to avail themselves of state resources."*

In this interview, it was suggested that targeted funding on a smaller scale focused on "meaningful notions of economic disadvantage and need, or maybe racial or gender disadvantage" would help to support diverse social businesses in creating social infrastructure inclusively. Our interviews therefore bring different scales of social infrastructure provision into tension, with some cases requiring breadth and expansiveness to span different uses and purposes, and other cases requiring a small and targeted focus to actively include those with greatest need.

Safety and exclusion

Safety was identified as a key feature of successful social infrastructures where exclusion is minimised. As an Australian interviewee described it:

> *"Anything that I believe these days is culturally safe, that is safe across multi-cultures, doesn't leave anyone out. It's accessible as much as possible. So anything that assists, you know, the gathering of people, from all creeds, walks of life really, together in a safe way, as we're interested is probably more the culturally safe things and understanding those sorts of things."*

Conversely, safety was also a feature of social infrastructure which was seen to actively exclude some in order to favour others. Examples of these in the interviews included women-only swimming pools in Europe, which in the past were associated with Christian nuns, and with contemporary examples catering to Muslim women. In Mexico City, women and children's underground train carriages also exclude men for safety reasons. In both cases, interviewees were ambivalent about this exclusion, and suggested it would be better to attempt inclusivity for all even if it is ultimately not possible.

There were other cases where some exclusion had been deliberately designed into social infrastructure in order to increase inclusion for specific groups. For instance, in the Netherlands, a park had been designed to exclude football:

> *"So one was there with water in the play area in the park, which was asked for by especially people with a migrant background. But also, people didn't want to have a place where only people could play football. And therefore they decided to have a slope in the park, which made a nice design, but also was very functional, because then it was more of a sitting place and where people could have a kind of extended garden, rather than a soccer field."*

These examples demonstrate how decisions can be made around purpose to include some and not others in social infrastructure. Yet no clear sense of which decisions are best, and which forms of exclusion should be accepted, emerges. It may be that the overarching message of this theme is that inclusion of all is always a worthwhile aim, but cannot be expected as a realistic outcome.

What we read

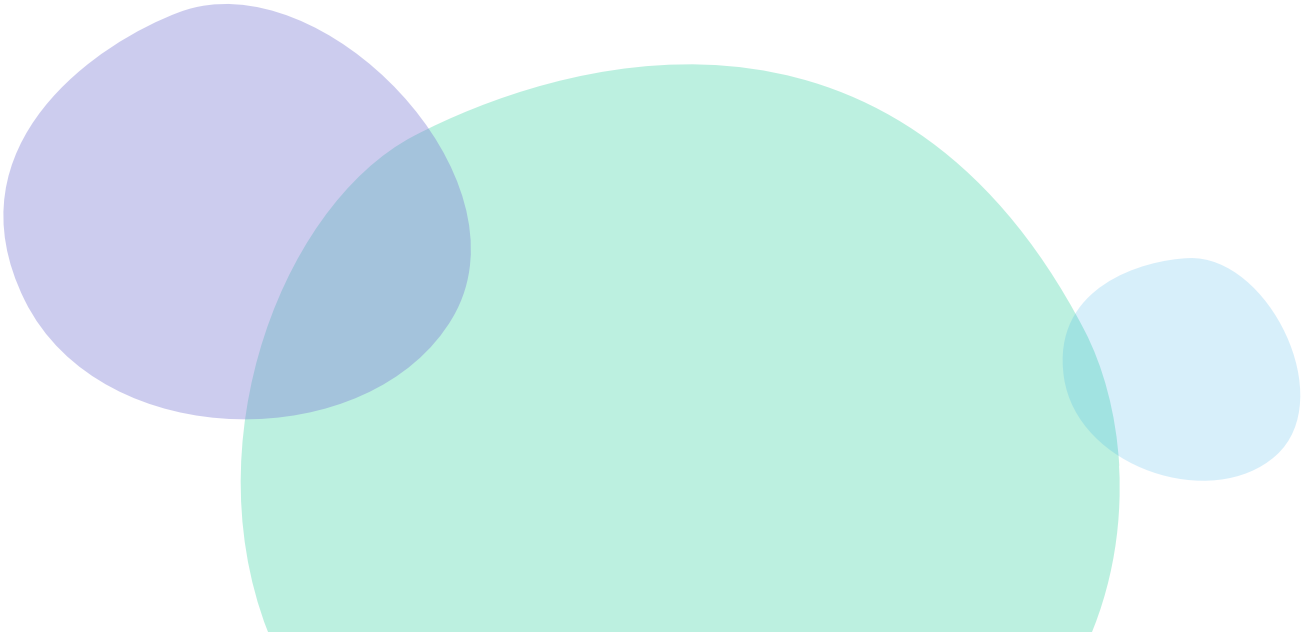
The dark side of social infrastructure

In discussing social infrastructure, we often find it connected to the concept of social capital. However, it is important to recognise the ways in which social capital can be exclusionary to some, while benefiting specific groups. Since Putnam popularised social capital as a socially, economically, and politically desirable force, many case studies have been identified that demonstrate how the complex power dynamics associated with social capital can make it a 'dark' factor (eg, Schulman & Anderson, 1999).

Furthermore, social capital can be problematic when applied as a measure to different cultural groups externally by those who have greater power, as has been documented in the Australian context (eg, Hunter, 2004). Just as including some in social infrastructure excludes others, the building of social capital among some groups can be disempowering to others.

To give an example, we were told about right-wing groups in the USA who have successfully developed and used social infrastructure to come together and further their social and political agendas, including the restriction or removal of women's rights to abortion. To critique such cases of social infrastructure, an underpinning framework is needed from which value judgements can be made - in this case, from a feminist framing we can argue that this example constitutes a negative use of social infrastructure.

Both deepening our understanding of how social infrastructure can have negative uses and impacts, and developing robust approaches for applying value judgements to social infrastructure, are areas in need for further research.



The exception that proves the rule

As discussed previously, the Nordic countries are often held up as exemplary because of their strong social capital which appears to have resisted declines seen in other regions. It should be noted however that there are exceptions to these trends, with the most vulnerable groups shown in some recent studies to have declining social trust despite the overarching positive trend in the Nordic region (Holmberg, 2020); nuance is therefore vital.

Interestingly, despite strong evidence to the contrary, a narrative of declining social capital exists in countries such as Sweden and Denmark (Rothstein, 2001; Torpe, 2003). Furthermore, some authors argue that despite historically strengthening social capital, this may be under threat from factors such as increased migration (Andreasson, 2017). These fears of migrants with different cultural backgrounds undermining Nordic social capital are indicative of the tensions around who this kind of capital includes, and who it does not.

It is also important to understand these concerns within broader research that explicitly disputes this and points to no correlation between factors such as increased migration with any social capital decline (Torpe, 2003). Others have argued that strong Nordic social capital may in fact be exclusionary and make integration by immigrants more challenging (Forsander, 2004). These debates exemplify the complexity that underlies the positive social capital trends in the Nordic region, which should be kept in mind when interpreting such trends, when treating the Nordic countries as exemplary, and when considering social capital more broadly.

Policy vignettes:
Digitisation of child benefits in Norway

e-Government and the accelerating digitisation and automation of public services is assumed to improve access, effectiveness and efficacy of public administrative procedures. These digitised processes, however, also bear negative side effects. Whereas reaching out to younger parts of the population is more successful via digital means, with regards to civic participation, the exclusion of non-e-literate persons is evident.

Digital exclusion originates from gaps in skills, capabilities, motivation and access to digital devices (Hatuka & Zur, 2020). In addition, automation itself bears risks of equality issues as automated systems are not capable of covering all citizens equally and can generate additional administrative burdens on already excluded parts of the population (eg, Buolamwini & Gebru, 2018).

In Norway child benefits are allocated automatically, based on registry data. However, not all eligible persons are being identified and those excluded must apply manually. The aim is to decrease administrative barriers to access governmental services by lowering administrative burdens (Larsson, 2021), this is achieved for standard situations and living conditions. Those however, who are in most need of public provision often lie outside these standard assumptions, and are consequently not covered by automated approaches; these “un-automatable” citizens experience a higher degree of administrative burden’ (Larsson, 2021, p. 9).

Social infrastructure for ageing populations

We have already seen how social infrastructure has been developed to meet the needs of some demographic groups at the expense of others. In our review of the literature, we identified social infrastructure designed for elderly people as a repeated and powerful example of this. Taiwan, for example, is on track to become a 'super aged' society (Statista, 2022) and Japan has already achieved this status, with nearly 30% of its population aged 65 or older (D'Ambrogio, 2020). With this in mind, we were keen to identify social infrastructure provision for the ageing population of these East Asian countries, taking care to identify tensions around inclusion and exclusion.

Taiwanese policy for ageing is both community- and place-oriented, and includes a specific focus on social participation (Y.Y. Lin & Huang, 2016). The country has committed to 'age-friendly cities', and is reported to have the largest number of such places in the world (Health Promotion Administration, 2019). The city of Chiayi is held up as a flagship for this approach:

> *'Community activities are also encouraged in Chiayi to improve mental health and social participation through community centers that provide such recreational programs as karaoke and croquet, as well as "peace-of-mind plans" and other specialized services.' (Bergström, 2021)*

In Japan, policy towards the ageing population includes targets for:

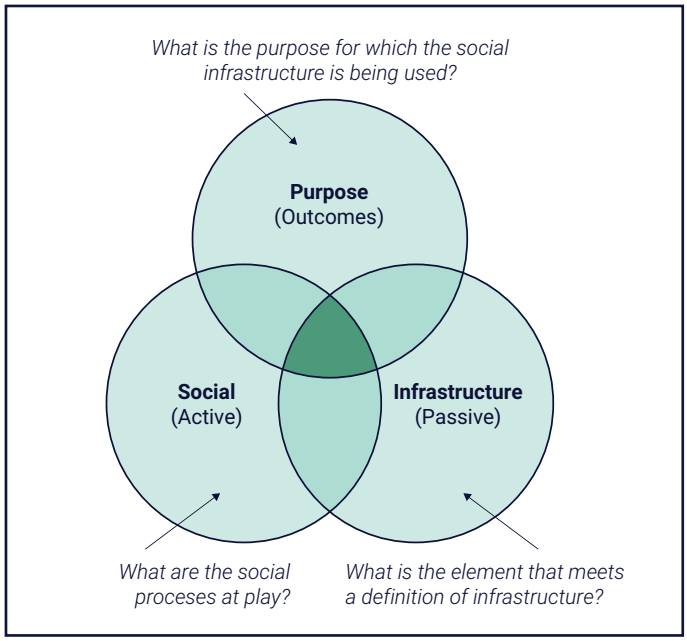
> *'the extension of 'healthy life expectancy' (average time spent without limitation to daily activities) and the reduction of health disparities (variations among prefectures in average time spent without limitations to daily activities).' (D'Ambrogio, 2020, p. 8)*

To that end, social infrastructure in Japan has been promoted as a key mechanism for enhancing wellbeing in the elderly, for example through the use of sports facilities to encourage higher levels of physical activity (Airth, 2020) and through greater internet literacy to maintain social ties (Airth, 2020). This approach is believed to improve community social capital, by allowing older people to take on new roles, as well as improving community knowledge and sense of community strengths (Ohta et al., 2021). This suggests a connection to pride in place, as well as health and wellbeing.

However, while social infrastructure policy in Japan may demonstrate innovative approaches to serve an ageing population, it does not address longstanding concerns about intergenerational equity as younger generations face economic and familiar burdens (Mason et al., 1989). This has been seen to impact intergenerational solidarity in both Japan and Taiwan (J.-P. Lin & Yi, 2013) and highlights how prioritising one demographic over another, while necessary, can also reinforce broader social and dynamic tensions between demographic groups.

3. Conclusion

The research presented in this report should be seen as a scoping piece. It is naturally speculative and contingent on the geographical areas we chose to cover and the people we chose to talk to. The six themes identified in the previous chapter represent our reflections on what we heard and what we read about social infrastructure. They do not fit into a framework that can be neatly packaged into a theory of change or measurement instrument. Nevertheless, our analysis does suggest a broad framework for understanding social infrastructure in the UK, divided into three dimensions:



- **Infrastructure:** Casually defined as 'something you can stub your toe on', there is a general consensus that social infrastructure must have at its core some element of actual infrastructure, either as the focal point for group activity or as the mechanism through which connections and relationships are mediated. (Care is needed with digital infrastructure, which can be conceived as both social infrastructure per se and as a channel for accessing social infrastructure.)
- **Social fabric:** To 'count' as social infrastructure, there must be some regular, active form of social engagement that goes beyond the individual or small network. This engagement weaves social infrastructure into the fabric of how we co-exist socially in different places. However, social infrastructure is not a pure public good (ie, non-excludable and non-rival) in the sense that access to it can be limited to certain members of the community (eg, the elderly).
- **Purpose:** Both in the literature and in our interviews it was clear that there must be some purpose or desired outcome that is being sought. This, for example, is the reason to exclude the entire 'natural world' unconditionally from any meaningful definition of social infrastructure. Critically, this purpose can be determined both top-down by a benevolent public authority ('stated' social infrastructure) or bottom-up by communities deciding for themselves how to use infrastructure in a social way ('revealed' social infrastructure).

Areas for future research

Our research can be treated as a scoping piece, offering provocation for future work more than seeking firm conclusions. Many areas for future research can be pointed to throughout this paper, however here we draw out a subset of these that would address avenues this research has not taken.

Social infrastructure development and use by communities of identity or interest

Our research has focused on communities of place, seeking different social infrastructure approaches in different international regions. However, community can also be understood around identities (eg, ethnicity, faith, or LGBTQ+ communities), or around interests (eg, sport, singing, or hobby communities). Future research on social infrastructure with these different community lenses would be a valuable direction.

Deep case studies of social infrastructure approach

In each of our selected literature review and interview regions, we discovered interesting examples of, and perspectives on, social infrastructure. However, this research did not focus on any one region in depth, seeking to fully understand the social infrastructure within it. Future detailed case studies on regional social infrastructure within specific places would therefore be a valuable addition.

Social infrastructure outcome evaluation

Our research has pointed to many ways in which social infrastructure is seen as beneficial, and some ways it can be seen as detrimental, to different communities in different contexts. This is shaped by the intended purpose: from promoting health and wellbeing, to tackling loneliness and improving community cohesion. However, we have not sought to evaluate the efficacy of the various social infrastructure initiatives described, and the extent to which they are achieving the intended outcomes remains an open question.

To do so would require the development of a theory of social change that links together specific forms of social infrastructure with specific types of social capital and, as a result, specific desired socio-economic outcomes. Constructing and testing alternative hypotheses would be a valuable next step and would fit well with the government's stated intention to 'introduce more experimentation at the policy design stage' (DLHUC, 2022b).

Appendix A: Participants

We are grateful to all participants for sharing their time and expertise with us. Some chose to be anonymous and some chose to be named; this list reflects those choices.

Australia

Dr Jonathan Kingsley, Swinburne University of Technology, researching public health and community development

Greg Grabasch, Scott Lang, and Tony Blackwell: professional landscape architects

Ohio

Sarah McKinley and Ted Howard, Democracy Collaborative

Anonymous member of the Ohio State Legislature

Anonymous member of a children's welfare NGO

California

Dr Steven C Gibson, University of California Irvine, researching participatory approaches to green space.

Colombia

Santiago Muñoz Arbeláez, and an anonymous member of a community archiving initiative

Mexico City

Begoña Irazábal, formerly at Laboratório Para La Ciudad, currently in the galleries and heritage sector

Elías Cattan, professional architect, Regenesis project

Taiwan

ST Peng, Social Innovation Lab, Taipei

Ted Hung, FabLab, Taipei

Indonesia

Zulfikar Dinar Wahidayat Putra, researching Smart Cities and urban planning

The Netherlands

Anonymous academic, researching inclusion in public space

Anonymous academic, researching urban geography

Belgium

Anonymous social enterprise investment manager

Prof Janina Gosseye, Delft University of Technology, researching architectural history

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