Debating Distributional Justice and the 15-Minute City in Belfast: Assumptions, Opportunities and Limitations in a Contested Space

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1 Introduction

The idea of the 15-minute city is a concept that frames ongoing efforts by urban areas around the world to enhance accessibility to essential services within communities. This draws upon 'traditional' urban forms, where urban settlements are distributed on a compact, walkable basis with key services and activities being easily accessible in a short time frame (Da Silva et al. 2019, Pozoukidou & Chatziyiannaki 2021). As this concept becomes increasingly embedded within urban planning, the application of the concept has been applied within many different cultural, geographical and political contexts. This moves us towards the focus of this paper, in which we debate and examine the assumptions, feasibility and challenges of operationalising the 15-minute city concept in Belfast, Northern Ireland. The city represents a unique context to debate the concept, and how it aligns with contemporary planning policy and practice, given the spatial impacts of protracted socio-political unrest (known as 'The Troubles') on the location of services and mobility behaviours that continue to shape the relationship between people and place in the city today.

As the achievability of the concept will differ considerably across diverse population distributions, urban contexts, and development priorities, we present the first analysis of its kind within a contested space, addressing a particular gap in understanding the fine-grained application of the 15-minute concept.

There is an assumption that if there are safe and pleasant routes to walk or cycle across and between neighbourhoods, which connect homes to key services, then individuals will use such routes to meet their daily needs. However, this assumption does not take into account the effects of segregation, which exists to a differing extent in different urban areas, and its impact upon accessibility and permeability. Whilst the Good Friday peace agreement, signed into place in 1998, brought the conflict to an end and reduced the levels of violence, there remain strong tensions between communities in Northern Ireland. These tensions can continue to lead to harassment, intimidation and occasionally periods of violence (Brand 2009).

This context has restricted the movements of many on both sides of the community, with many living within highly segregated neighbourhoods. In such communities, rather than crossing sectarian boundaries, individuals may adjust their movement and use of services (Shirlow & Murtagh 2006, Davies et al. 2019). The street layout of Belfast, particularly within residential areas closer to the city centre, includes many 'dead-ends' and cul-de-sacs. Other physical barriers such as fences, major roads and large 'voids' alongside intentionally physical interventions such as 'Peace walls", intentionally constructed to segregate communities at the height of the conflict (Bryne, Heenan and Robinson, 2012).

Shared perceptions of which communities 'belong' are reinforced by different forms of boundary marking, including murals, flags, and painted curbs (Hughes et al. 2007). Importantly, for the consideration of the 15-minute city, this physical and emotional legacy of 'the troubles' also serves to reduce connectivity and permeability across the city. Recent work across segregated communities in North Belfast, making use of GPS tracking, suggests that communities remain largely disconnected from the 'other' community (Davies et al. 2019). Using the latest socioeconomic data and spatial analysis, the paper critically examines the opportunities and limitations around notions of proximity and accessibility for producing equitable access to various resources and services in a contested space. It does so as an exploratory study to understand, in theory, how accessible different areas of the city are. The paper then interrogates the outcomes of this analysis, which, beyond the physical street layout, is 'blind' to the segregation in Belfast.

2 Methods

This chapter implements an approach which attempts to assess differences in accessibility within the city of Belfast, United Kingdom. To do so, an accessibility score is obtained, which allows an approximation of the services which individuals within different areas can access, the key services which represent the '15-minute city'. To do so, the study relies upon three datasets, which together allowed the calculation of accessibility scores.

First, the street/path network within Belfast, this network was obtained from OpenStreetMap (2025). This allowed a graph of all roads, streets and paths which were navigable on foot to be created within 'R'. Second, the types of services which could be commonly thought to represent the '15-minute city' were defined (see Table 1 for details). The researchers reviewed a series of existing literature regarding the '15-minute city' and used this to define nine types of services/shops, which represent the categories of services for the 15-minute city. Third, the geographical area which is used to define different areas of Belfast is a Datazone. They are the smallest spatial area where data is provided in Northern Ireland, with an average population of 500 per Datazone (NISRA 2023). These form the origin points from our analysis.

POI Service Type	**Types of POI**
Food Shops	Supermarkets, Convenience Stores, Bakeries, Butchers, Confectioners, Delicatessens, Fishmongers, Tea and Coffee, Merchants, Herbs and Spices, Grocers.
Food & Drink (Eating out)	Restaurants, Café, Pub, Bar, Fast Food, Food Court
Transport	Bus Stop, Train station
Sport Facilities	Sports Centre, Stadium, Pitches, Gym, Swimming Pool.
Green Space	Parks, Recreation Grounds, Gardens, Commons, Playgrounds.
Education	Primary Schools, Secondary Schools, Colleges.
Health Facilities	Doctors, Clinics, Pharmacy, Hospitals, Dentist.
Places of Worship	Places of Worship.
Entertainment & Culture	Cinema, Nightclub, Social Club, Theatre, Arts Centre, Concert Hall, Museum, Art Gallery.

Table 1: List of services which represent the 15-minute city, and types of POI in OSM.

Using the Dodgr package in R (Padgham 2025), in conjunction with OSM street map data, an origin-destination matrix between all Datazone population-weighted centroids and POIs within Belfast was created. To capture which POIs were accessible within a 15-minute round trip, capturing the concept of the 15-minute city, a 'cut-off' out 589.5m was chosen, which represents 7.5 minutes walking at 1.31m per second, defined as an average healthy adult's walking pace. Then, for each Datazone a summary table was produced that calculated which POI categories were accessible within 7.5 minutes.

If at least one POI within a service category was present, a score of +1 was given to the Datazone. This provided each Datazone with a score of 0-9, with 0 indicating none of the nine service types were accessible within a 7.5-minute walk. This data was then plotted onto the map (Figure 1), providing a visual representation of the accessibility within Belfast.

3 Results

Figure 1 illustrates the accessibility to services within different Datazone in Belfast. The areas with the 'warmer' colours of yellow are areas with the greatest access to the suite of nine key services/shops that are used to represent the '15-minute city'. In contrast, Datazone with 'cooler' colours of blue are areas with worse accessibility.

The Datazones within the City Centre, and those adjacent to it, illustrate the highest level of accessibility, with areas with the highest scores of 9/8 being clustered within these areas. This reflects the higher concentration of services of all kinds within this area, the historic and current role of the city centre as the hub for retail and other services, as well as the high population density within these areas, allowing these services to be well used.

It is these areas which are either already, or nearly functioning as '15-minute neighbourhoods', with the high accessibility of services meaning that residents would not have to depend on private vehicles and/or public transport to access essential services. However, areas beyond the urban core, generally made up of suburban areas and/or semi-rural fringes of the city, exhibit much lower levels of accessibility, with almost all services requiring a walking time beyond 7.5 minutes.

Permeability Challenge 1: Physical Barriers

A further consideration within the context of Belfast is the presence of 'Peace Walls' – these are illustrated on Figure 1 in green. These create a physical barrier between certain communities within the city; these barriers often cross

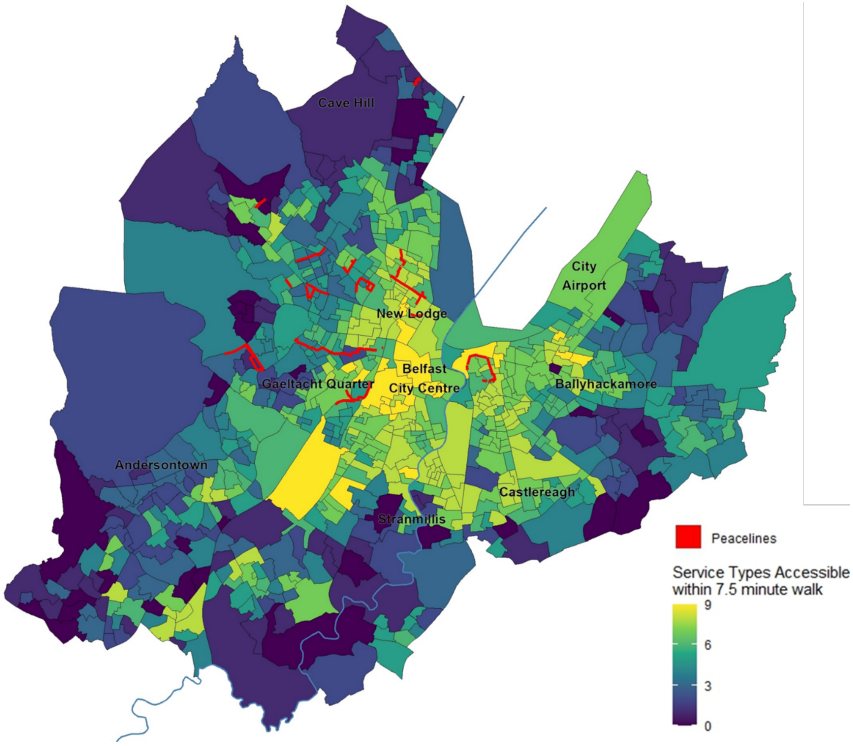

Figure 1: Accessibility of Datazones in Belfast to nine 'essential' service types

'interfaces' which have vehicle and/or pedestrian gates which are closed at certain times of the day, and in certain, more rare, circumstances at all times of the day. As a result, many of the communities may be less accessible than represented and have lower accessibility scores than is represented in the data.

Permeability Challenge 2: Street layouts and the legacy of 'The Troubles' The street layout within Belfast often contains cul-de-sacs, dead ends and a lack of 'alleyways', 'cut-throughs' or side roads which connect across different communities. This was intentional to segregate populations, for security purposes, as well as to enhance territorial concentration and community identity. This means that the distances taken across many areas are increased, again reducing accessibility scores.

Permeability Challenge 3: Psychological' barriers and the legacy of 'The Troubles' Beyond this, some individuals within different communities may see the interfaces, peacelines and other locations and areas of the city as 'psychological' barriers. This means that even if barriers in 'interface' locations are open,

or there are no ‘peacewalls’ in place, an individual would be very unlikely to take the ‘fastest route’ or even consider visiting one of the POIs pairs (i.e. from a datazone centroid to a service) used in this study.

This would then mean that the ‘alternative’ route (i.e. avoiding areas deemed as unsuitable) taken from an origin point to a destination (or an alternative destination away from areas deemed as unsuitable) would take the walking time beyond 7.5 minutes.

4 Discussion and Conclusion

The physical and psychological barriers resulting from decades of division present challenges for policy-makers in achieving distributional justice through the 15-minute concept in Belfast. The key challenge stems from the duplication of service provision. This service duplication not only drives up the cost of maintaining a good level of accessibility to both communities but also risks reinforcing segregation and division within the community.

As illustrated earlier, for those living on the edge of the community, particularly adjacent to ’peacelines’, the current situation equates to having reduced accessibility. Even where physical permeability is possible across ‘peacelines’, the context can mean that the representation presented in Figure 1 does not accurately represent the lived experience in terms of accessibility.

The particular context of Belfast makes effective community relations difficult and shifts the focus onto merely accessing services versus achieving broader social outcomes. Ultimately, this contested nature potentially undermines the accessibility, permeability and liveability of the community as a whole.

The analysis presented in this paper has several limitations, one of which is centred around the compromises of an open-source approach. The reliance on crowd-sourced data on OpenStreetMap introduces uncertainty and may not represent a totally accurate and up-to-date representation of service availability. Another issue relates to the impact of ’peacelines’ on route calculation, as these physical barriers disrupt standard mapping algorithms. Further compounding this is the difficulty in understanding and mapping ’non-physical’ interfaces and social-psychological geographies, which would help to provide a more accurate representation of the lived experience of those living in Belfast.

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