

Children's time spent living locally, socioeconomic variation in spatial access to local facilities and the 20-minute neighbourhood.

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Summary

There has been a recent and renewed interest in planning policies that focus on living locally, specifically concepts such as 20-minute neighbourhoods. Despite the adoption of the 20-minute neighbourhood policy in a large number of cities globally, there is surprisingly little evidence of whether having access to important facilities and amenities required for daily locally living are associated with more time spent living locally. That was the aim of this study. There was variation in the built and natural environments within 800m of children's homes between those living in the most/least deprived and between urban/rural areas of Scotland.

KEYWORDS: GPS; urban mobility; 20-minute neighbourhoods; x-minute city; inequalities.

1. Introduction

There has been a recent and renewed interest in planning policies that focus on living locally, specifically concepts such as *20-minute neighbourhoods* or the *'X'-minute city*. By the end of 2020, over 33 global cities had implemented or were considering adopting the 20-minute neighbourhood policy into their development plans (Gower and Grodach, 2022). The policy is rooted in a compact city design that encourages places to be designed to provide communities and their residents access to well-connected facilities and amenities, such as education, essential services, shopping, open spaces and public transport, within a short walk to their homes to enable daily local living (Chau et al., 2022; Giles-Corti et al., 2016). A 20-minute neighbourhood policy means these facilities and amenities can be accessed within a 10-minute walk to-and-from a residential location (Olsen et al., 2022).

Despite the adoption of the 20-minute neighbourhood policy in a large number of cities globally, there is surprisingly little evidence of whether having access to important facilities and amenities required for daily locally living are associated with more time spent living locally or whether specific features may increase or decrease time in those neighbourhoods. We found no evidence describing children's time spent living locally and the features of a 20-minute neighbourhood together and individually. That is the aim of this study.

1.1. Study aims

- I. Create 800m road and path home network buffers for SPACES children in Scotland.

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- II. Identify a comprehensive list of spatial features associated with children's time spent living locally.
- III. Describe variation in spatial features within children's 800m home network buffers by sex, socio-economic and urban/rural status.
- IV. Link detailed mobility data for children to their home network buffers to describe the proportion of time spent living locally by weekday, weekend and overall.
- V. Explore whether specific spatial features within children home network buffers are associated with more or less time spent living locally.

2. Methods,

2.1 Study setting and participants

The study used data from the SPACES (Studying Physical Activity in Children's Environments across Scotland) study. SPACES is a national cross-sectional dataset in Scotland, a country and devolved administration within the UK. From a possible 2,402 children who had participated in the 2014/2015 GUS interviews (aged 10/11 years old), 90% (n=2,162) of parents consented to be contacted about SPACES (McCrorie et al., 2017). A total of 667 children were included within this study.

Children who consented to participate in the study were provided with a GPS device (Qstarz BT-Q1000XT; Qstarz International Co., Ltd, Taiwan) and asked to wear the device over eight consecutive days during the waking hours.

2.2 Defining a 20-minute neighbourhood boundary

We created 800-meter buffers surrounding the individual home location of all SPACES children within the Network Analyst extension (ArcGIS Pro 2.9.2) using the road and path network (Integrated Transport Network (ITN) Layer, OS MasterMap).

2.3 Neighbourhood characteristics

We derived a number of neighbourhood characteristics from the global literature base that have been associated with children's time spent living locally (both increased and decreased), the Healthy Environments Index for Children (Whitehead et al., 2023) and those highlighted within 20-minute neighbourhood policy (Thornton et al., 2022; Olsen et al., 2022).

3. Results

3.1 GPS wear time within 800m of home by weekday/weekend, gender, socioeconomic status and urbanicity

Overall, 60% of children's GPS wear time was within the home neighbourhood (800m road and path network buffer) (Table 2). When comparing weekday to weekends, 66% of weekday wear time was spent locally and 58% during weekends. There was little variation by gender across the measurement periods. There was variation in the proportion of GPS wear time by socioeconomic status across all time periods; children living in the most deprived areas of Scotland spending a greater time locally compared to the least deprived areas (weekday: Most deprived: 66%, Least Deprived 53%).

Table 1 Proportion of time spent living locally (within 800m of home) by sex, socioeconomic status and urbanicity.

	n	All Proportion (mean)	Std. dev.	n	Weekday Proportion (mean)	Std. dev.	n	Weekend Proportion (mean)	Std. dev.
Gender									
Female	30			30			29		
	8	59.9	22.9	8	57.3	27.3	3	67.5	23.8
Male	37			37			36		
	9	60.1	24.1	9	58.9	27.9	2	64.5	25.6
Socioeconomic status									
1 – Most Deprived	57	67.1	24.4	57	66.1	28.7	52	71.8	23.3
2	81	67.1	23.4	81	68.3	27.0	79	63.4	27.9
	14			14			13		
3	0	62.1	24.8	0	59.8	29.0	2	69.2	25.0
	18			18			17		
4	0	58.8	23.2	0	57.2	27.5	3	64.7	24.8
5 – Least Deprived	22			22			21		
	9	55.3	21.7	9	52.5	25.4	9	64.2	23.7
Urban / Rural									
Large Urban Areas	21			21			20		
	3	58.8	24.8	3	57.1	29.0	2	64.6	23.5
Other Urban Areas	20			20			19		
	3	63.8	21.8	3	62.0	26.0	5	70.0	23.3
Accessible Small Towns	69	61.1	21.7	69	60.8	25.7	66	61.7	26.1
Remote Small Towns	22	72.5	27.4	22	73.4	29.5	22	66.0	30.3
Accessible Rural Areas	11			11			11		
	6	56.4	22.3	6	53.8	27.0	1	65.3	25.6
Remote Rural Areas	64	52.9	24.3	64	49.7	27.2	59	61.9	27.7
Total									
	68			68			65		
	7	60.0	23.5	7	65.8	24.8	5	58.2	27.6

3.2 GPS wear time and presence of neighbourhood characteristics within 800m of home by weekday/weekend, gender, socioeconomic status and urbanicity.

Overall, children spent approximately 60% of their GPS wear time within 800m of their home. Figure 1 shows variation in the proportion of GPS wear time within 800m from home by presence/absence of facilities and amenities, by gender, socioeconomic status and urbanicity. Across the facilities and amenities, most of the variation in GPS wear time spent living locally was by socioeconomic status; children from the most deprived areas spent more of their GPS wear time within 800m of their home compared to those from the least deprived areas.

		Total	School		Urban density and transport				Retail				Amenities				Greenspace, sport, and recreation				Land-use diversity			
		School (attends)	School (any)	Residential density*	Pub transport	Major road*	Minor road*	Retail ALL	Retail (non-food)	Healthy food retail	Unhealthy food & drink	Financial	Health	Place of worship	Libraries	Sports and recreational facilities	Natural space*	Private gardens*	Greenspace access point	Municipal parks*	Openspace	Manufacturing	Public Infrastructure	
Gender	Female	60	79	72	57	61	62	62	63	63	66	62	63	67	65	68	64	57	62	62	62	60	60	61
	Male	60	81	70	55	61	62	65	62	62	65	63	63	63	64	70	67	58	60	62	63	62	61	61
SIMD	1 – Most Deprived	67	86	70	63		74	68	67	68	69	67	68	71	67	66	66	63	65	67	65	66	67	
	2	67	83	74	60		68	71	68	71	69	68	69	66	69	69	72	65	67	67	69	67	66	
	3	62	83	74	59		63	67	66	66	66	63	65	70	69	76	69	62	62	64	68	64	62	
	4	59	76	70	56		62	63	60	59	65	62	62	63	63	73	65	57	63	61	62	60	58	
	5 – Least Deprived	55	78	67	53		55	59	58	58	62	58	58	58	57	62	59	52	51	57	55	56	56	
Urban/Rural	Large Urban Areas	59	82	67	51		56	60	59	60	61	58	59	62	59	64	60	54	59	59	58	59	58	
	Other Urban Areas	64	83	71	56		66	67	65	65	68	66	67	67	68	71	68	63	63	64	66	64	63	
	Accessible Small Towns	61	80	72	60		67	72	63	63	63	64	63	64	67	69	66	62	67	61	69	60	62	
	Remote Small Towns	72	89	89	63		75	91	75	72	81	79	78	81	79	94	90	68	75	74	75	77	74	
	Accessible Rural Areas	56	74	70	56		61	62	62	62	66	62	63	63	61	69	67	55	60	61	61	58	59	
	Remote Rural Areas	53	78	80	53		60	78	64	65	78	66	64	72	70	79	76	52	68	62	72	61	55	

Figure 1 Proportion of GPS wear time spent within home neighbourhood by weekday, weekend, overall and variation by sex, socioeconomic status and urbanicity.

4. Discussion

There was variation in the built and natural environments within 800m of children’s homes between those living in the most and least deprived and between Urban and Rural areas of Scotland. Across all domains, children living in the most deprived areas had a greater number or proportion of neighbourhood characteristics compared to the least deprived areas. 3) Importantly, this included both health benefiting and health harming neighbourhood characteristics. This highlights the importance of looking at these factors together rather than in isolation, for example if we only looked at health benefiting environments, we may suggest that children living in the least deprived areas benefit more than those in the most deprived areas. Exploring only health damaging environments, we find that children living in the least deprived area have less access to these within their 20-minute neighbourhood boundary. Alternative policy approaches may be required to create healthy local 20-minute neighbourhoods. Such as limiting the density of health harming facilities (fast-food, alcohol, tobacco outlets) and reducing road speeds in densely populated areas.

5. Acknowledgements

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Biographies

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