The Impact of 2020 Low Traffic Neighbourhoods on Fire Service Emergency Response Times, in London, UK

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Findings

Between March and September 2020, 72 'Low Traffic Neighbourhoods' (LTNs) were implemented in London. We examined the impact on fire brigade emergency response times in October 2020-February 2021 ('post'), as compared to the same months in the previous two years ('pre'). We found no evidence that response times inside the LTNs or on boundary roads were affected (e.g. pre/post change for first engine: -14 seconds inside LTNs; -11 seconds in the rest of London; p=0.4 for difference). Fire crews reported more delays due to 'traffic calming measures' in LTNs, but this was entirely offset by a decrease in delays for other reasons, particularly 'traffic'. This was true both in LTNs that predominately blocked motor traffic using physical barriers (e.g. planters) and in LTNs using camera enforcement. These findings add to evidence that LTNs do not adversely affect emergency response times.

1. Questions

Cities and countries across the world have implemented new active travel infrastructure as part of Covid-19 responses. In London, 72 Low Traffic Neighbourhoods (LTNs) were rapidly rolled out in March-September 2020 under emergency legislation, covering around 300,000 people (4% of London's population) (Aldred et al. 2021). LTNs use 'modal filters' to restrict through motor traffic in residential areas, aiming to discourage driving and to create safer and more pleasant cycling and walking environments.

One concern sometimes raised about LTNs is that, because they restrict motor vehicle access, they may slow response times for emergency services. For LTNs that involve physical barriers, emergency vehicles might have to drive further to reach their destination or stop to unlock a gate. Some LTNs are designed to use camera-enforced closures with emergency vehicle access; however, concerns are still sometimes raised that emergency vehicles could be delayed by increased congestion on surrounding main roads or by having to slow down to navigate the gap between planters.

As LTNs in the UK are a relatively new intervention, the evidence base on such issues is scarce. It currently largely rests on studies of the London Borough of Waltham Forest which introduced several LTNs between 2015 and 2019. A previous study found that the introduction of the Waltham Forest LTNs was not associated with any deterioration in London Fire Brigade emergency

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response times (Goodman, Laverty, and Aldred 2020). However, it is possible that impacts of 2020 LTNs could be less positive, for example as these lacked the extensive planning and pre-consultation periods used in Waltham Forest. The view of the London Fire Brigade is that "we haven't yet noticed any impact on our attendance times due to the LTN schemes established in 2020" (London Fire Brigade 2020, 2). Nevertheless, the possibility of negative impacts on emergency response times has been one key controversy surrounding the implementation of the 2020 LTNs, and the focus of much local and some national media coverage.

In this paper we therefore examine the initial impact of London's 2020 LTNs on London Fire Brigade emergency response times.[1] We also present analyses of whether any identified impacts differed between LTNs predominantly using physical barriers (e.g. planters) versus using camera enforcement.

2. Methods

We used information from a range of official sources to map all new modal filters[2] implemented from March-September 2020 in London and still in place at the end of October 2020.[3] Based on these we manually mapped LTNs and identified the surrounding boundary roads (details in Aldred et al. 2021. See [Figure 1](#)).

We compared October 2020 – February 2021 to the corresponding months in 2018/19 and 2019/20. During this time, the London Fire Brigade responded to 122,440 emergency incidents, of which we excluded 6,822 that lacked response times (e.g. because firefighters were instructed to return to the station before arriving).[4] Incident coordinate data were available to the nearest metre for 47% of the remaining 115,618 incidents, with the rest having coordinate data to the nearest 100 metres.

Our primary outcomes were the mean response times of the first and second attending engines. When first engine attendance time is >360 seconds, firefighters are asked for the reason for the delay. We examined proportion of delays assigned to different reasons.

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1 We focused on the London Fire Brigade because geographically-detailed data on response times is unfortunately not available from the London Metropolitan Police or London Ambulance Service.

2 A 'modal filter' is a bollard, camera gate, planter, or other street feature that restricts motor traffic fully or partially (the latter might involve a camera-controlled bus gate, or other specific exemptions such as local refuse vehicles). They are intended to reduce through motor traffic on a neighbourhoods' streets.

3 One LTN in Lewisham, was modified to allow some through traffic on some roads in November 2020. In addition, some Central London LTNs ('dining streets') were scaled back or removed from November 2020 onwards. In February 2021, further changes were made to a range of LTNs, including modal filters being temporarily removed in Croydon and permanently removed in Sutton. Our findings were very similar in sensitivity analyses excluding these LTNs, or in analyses restricted to the months October–January. Only around 15 new LTNs were introduced in London October 2020 – February 2021, compared to 72 in our study sample.

4 Data available from https://data.london.gov.uk/dataset/london-fire-brigade-incident-records and https://data.london.gov.uk/dataset/london-fire-brigade-mobilisation-records .
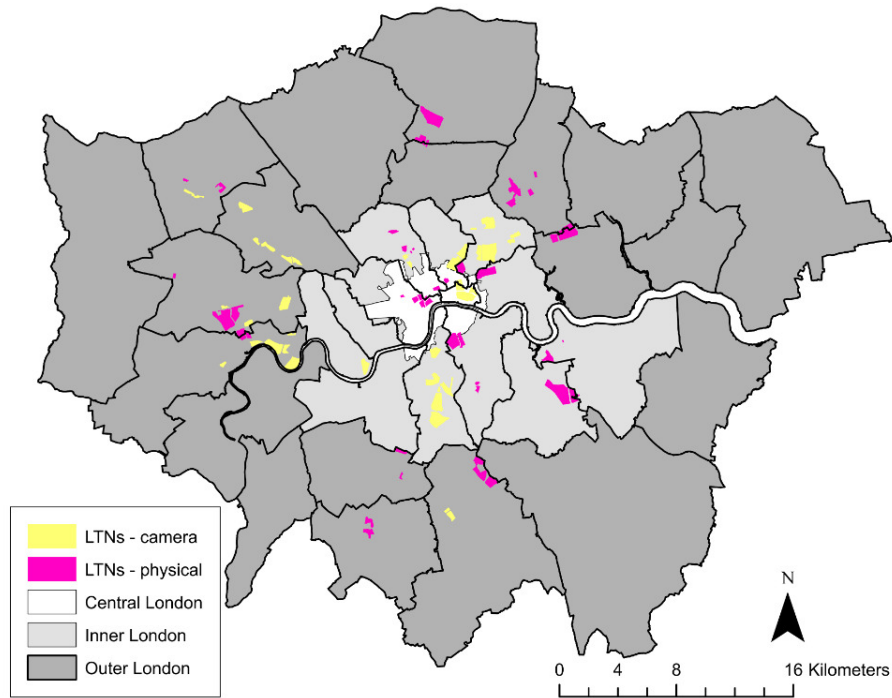
Figure 1: Map of low traffic neighbourhoods (LTNs) created in London March-September 2020

LTNs are colour-coded according to whether >50% of modal filters were designed to use camera or sign enforcement (LTNs – camera) versus ≥50% of modal filters used physical barriers (LTNs – physical).

We identified whether each incident was A) inside a 2020 LTN or B) <25m from an LTN boundary road. We also identified two overlapping comparison groups: C) incidents outside LTNs (i.e. not in group A or B) but <500m from an LTN, and D) incidents outside LTNs and anywhere else in London. For each of these four groups, we present descriptive analyses comparing October-February 2020/21 to October-February 2018/19+2019/20. We also present significance testing comparing LTN areas (A) and boundary roads (B) to the surrounding areas (C) and the rest of London (D), using interaction terms in linear regression analysis.

After analysing results for the 2020 LTNs as a group, we stratified our analysis according to the LTN's main modal filter type. We defined this as a binary variable based on whether most modal filters were enforced by cameras and/or signs (i.e. fire engines can pass through) versus physical barriers (i.e. fire crews must unlock a bollard or detour around).[5]

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5 Two LTNs with equal numbers of camera and physical modal filters were defined as mainly 'physical'. Two LTNs that changed their main modal filter type during October 2020 - February 2021 were defined according to the type operational for the majority of the months. Two LTNs in Brent were designed to involve physical filters but did not in fact physically block the road for most of the follow-up (e.g. because a central bollard was removed), instead relying on signage. We classified these as 'camera'.

Table 1: Change in London Fire Brigade response times following implementation of 2020 LTNs, by LTN status

Outcome		Inside LTNs (A)	LTN boundary roads (B)	Surrounding area: Outside LTNs, <500m from boundary (C)	Outside LTNs (D)
First engine time	Number of incidents pre / post	3382 / 1538	2457 / 950	11,715 / 5177	73,100 / 34,191
	Mean response time (SE) in seconds, pre	294 (2.0)	273 (2.4)	296 (1.1)	313 (0.5)
	Mean response time (SE) in seconds, post	280 (2.7)	260 (3.5)	286 (1.6)	303 (0.7)
	Change in seconds (SE), post minus pre	-14 (2.2)	-13 (2.4)	-10 (1.6)	-11 (1.1)
	p-value for difference vs 'Surrounding area' (C)	p=0.39	p=0.61		
	p-value for difference vs 'Outside LTNs' (D)	p=0.43	p=0.67		
Second engine time	Number of incidents pre / post	1291 / 633	858 / 346	4635 / 2195	30,595 / 14,961
	Mean response time (SE) in seconds, pre	372 (3.6)	354 (5.0)	370 (1.9)	392 (0.8)
	Mean response time (SE) in seconds, post	351 (5.3)	340 (6.9)	359 (2.7)	379 (1.1)
	Change in seconds (SE), post minus pre	-21 (3.0)	-14 (3.4)	-10 (2.1)	-13 (1.4)
	p-value for difference vs 'Surrounding area' (C)	p=0.13	p=0.73		
	p-value for difference vs 'Outside LTNs' (D)	p=0.26	p=0.98		

LTN = Low traffic neighbourhood. SE = standard error. 'Pre' period is October 2018-February 2019 plus October 2019-February 2020. 'Post' period is October 2020-February 2021. Note second engines only attended in 42% of incidents. Areas 'Outside LTNs' exclude LTN boundary roads. P-values calculated as interaction terms in linear regression analyses, with response times as the outcome and fitting interaction between pre/post status and LTN status (e.g. inside vs outside LTNs). Results were similar in sensitivity analyses excluding outliers (response times <30 seconds or >900 seconds).

3. Findings

All areas at both 'pre' and 'post' time points were comfortably within the London Fire Brigade's target of first engine average response time <360 seconds, second engine <480 seconds (London Fire Brigade 2020). There was no evidence that the introduction of LTNs was associated with a change in the response time for the first attending engine. The same was true for the second attending engine (Table 1). This lack of any impact applied both inside LTNs and on boundary roads – we did not replicate the slight improvement on boundary roads observed in Waltham Forest (Goodman, Laverty, and Aldred 2020).

This lack of impact on response times was also observed when stratifying by Central/Inner/Outer London status (see Supplemental Information), and when stratifying by whether the LTN predominately used physical or camera-enforced modal filters (see Table 2).

Table 2: Change in London Fire Brigade response times following implementation of 2020 LTNs, by main modal filter type.

Main modal filter type	Outcome		Inside LTNs (A)	LTN boundary roads (B)	Surrounding area: Outside LTNs, <500m from boundary (C)	Outside LTNs (D)
Camera	First engine time	Number of incidents pre / post	1757 / 808	1164 / 497	5152 / 2401	73,100 / 34,191
		Mean response time (SE) in seconds, pre	292 (2.6)	275 (3.5)	285 (1.6)	313 (0.5)
		Mean response time (SE) in seconds, post	280 (3.6)	262 (4.7)	283 (2.3)	303 (0.7)
		Change in seconds (SE), post minus pre	-12 (2.5)	-14 (2.9)	-3 (2.0)	-11 (1.1)
		p-value for difference vs 'Surrounding area' (C)	p=0.10	p=0.11		
		p-value for difference vs 'Outside LTNs' (D)	p=0.81	p=0.66		
	Second engine time	Number of incidents pre / post	727 / 373	432 / 186	2187 / 1079	30,595 / 14,961
		Mean response time (SE) in seconds, pre	364 (4.7)	354 (7.1)	363 (2.8)	392 (0.8)
		Mean response time (SE) in seconds, post	346 (6.8)	326 (9.1)	352 (4.0)	379 (1.1)
		Change in seconds (SE), post minus pre	-17 (3.4)	-28 (4.0)	-11 (2.6)	-13 (1.4)
		p-value for difference vs 'Surrounding area' (C)	p=0.49	p=0.18		
		p-value for difference vs 'Outside LTNs' (D)	p=0.66	p=0.26		
Physical	First engine time	Number of incidents pre / post	1625 / 730	1293 / 453	6563 / 2776	73,100 / 34,191
		Mean response time (SE) in seconds, pre	295 (3.1)	271 (3.4)	305 (1.6)	313 (0.5)
		Mean response time (SE) in seconds, post	280 (4.2)	258 (5.2)	289 (2.2)	303 (0.7)
		Change in seconds (SE), post minus pre	-16 (2.7)	-12 (2.9)	-16 (1.9)	-11 (1.1)
		p-value for difference vs 'Surrounding area' (C)	p=0.99	p=0.63		
		p-value for difference vs 'Outside LTNs' (D)	p=0.38	p=0.82		
	Second engine time	Number of incidents pre / post	564 / 260	426 / 160	2448 / 1116	30,595 / 14,961
		Mean response time (SE) in seconds, pre	383 (5.7)	353 (7.0)	376 (2.6)	392 (0.8)
		Mean response time (SE) in seconds, post	357 (8.5)	356 (10.4)	366 (3.6)	379 (1.1)
		Change in seconds (SE), post minus pre	-26 (3.8)	3 (4.2)	-10 (2.5)	-13 (1.4)
		p-value for difference vs 'Surrounding area' (C)	p=0.13	p=0.33		
		p-value for difference vs 'Outside LTNs' (D)	p=0.25	p=0.23		

LTN = Low traffic neighbourhood. SE = standard error. 'Pre' period is October 2018-February 2019 plus October 2019-February 2020. 'Post' period is October 2020-February 2021. P-values calculated as interaction terms in linear regression analyses, with response times as the outcome and fitting interaction between pre/post status and LTN status (e.g. inside vs outside LTNs). Main modal filter type defined for 72 LTNs, based on the most common modal filter type within that LTN: camera-enforced (N= 32, i.e. fire engines can pass through) versus physical (N = 40, i.e. fire crews must unlock a bollard or detour around). For analyses focused on the 'mainly camera' modal filters, we excluded from the analysis all incidents in categories A/B/D that were nearer to a 'physical filter LTN' than a 'camera filter LTN', and vice versa. Category C was the same in both sets of analyses, and also the same as presented in Table 1.
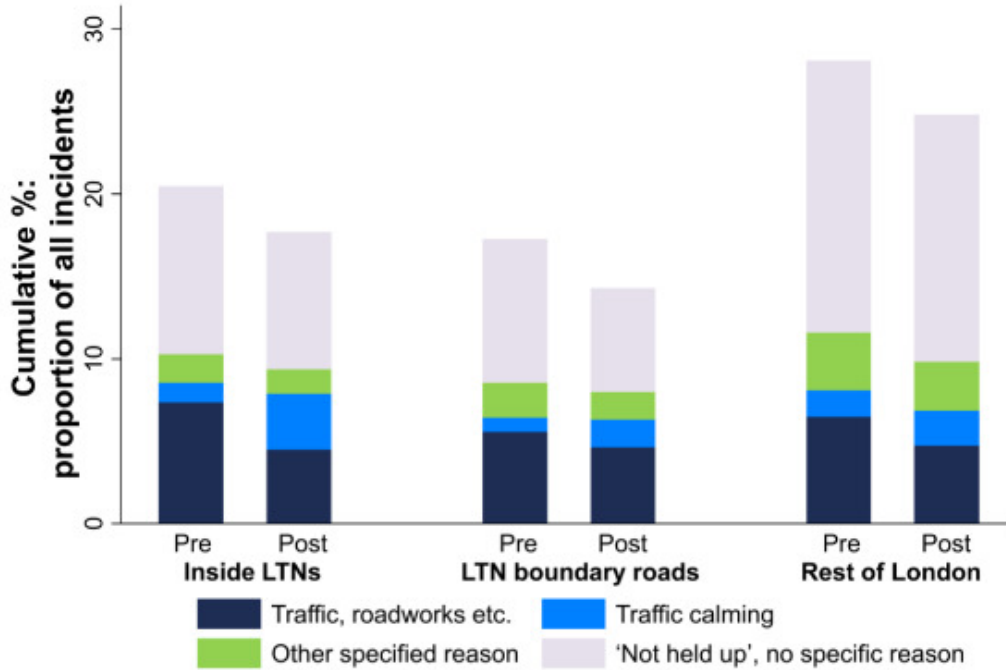
Figure 2: Change in proportion of delayed first engines (>360 seconds) and in the composition of causes for those delays, following the introduction of low traffic neighbourhoods.

LTN = low traffic neighbourhood. p-values for pre/post difference in the composition of causes for delay: $p<0.001$ inside LTNs, $p=0.04$ on the LTN boundary roads, $p<0.001$ in the rest of London. See the Supplemental Information for a tabulation, and for these results stratified according to whether the LTN predominantly used physical barriers versus camera-enforced modal filters.

The proportion of delayed first engines (i.e. taking >360 seconds to arrive) decreased somewhat in all area types (e.g. from 21% to 18% inside LTNs, from 28% to 25% in the rest of London: see Figure 2). In all areas, but particularly inside LTNs, there was an increase in the proportion of incidents coded as 'delayed due to traffic calming' (from 1.2% to 3.4% inside LTN areas, from 1.6% to 2.1% in the rest of London). This was, however, more than offset by a decrease in the proportion of incidents coded as delayed for other reasons, particularly 'delayed by traffic, roadworks etc'. There was a larger increase in the proportion of incidents coded as 'delayed due to traffic calming' in LTNs predominantly using physical barriers (from 1.1% to 4.0%) than in LTNs predominantly using camera-enforced filters (from 1.3% to 2.9%: see Supplemental Information). Yet in both LTN sub-types, the overall proportion of delays fell two to three percentage points. These findings are in line with previous evidence that LTN introduction does not increase delays overall, but that while LTNs are novel the perception of delay may exist among some crews (Goodman, Laverty, and Aldred 2020). The present findings indicate this effect is particularly marked where most modal filters involve physical barriers.

In summary, we have used London-wide data from the London Fire Brigade and found no evidence that the LTNs implemented in London in 2020 adversely affect emergency response times. This includes in LTNs

predominantly using physical barriers as modal filters. This substantiates the Fire Brigade's own view that the 2020 LTNs have not affected response times (London Fire Brigade 2020).

REFERENCES

Aldred, R., E. Verlinghieri, M. Sharkey, I. Itova, and A. Goodman. 2021. "Equity in New Active Travel Infrastructure: A Spatial Analysis of London's New Low Traffic Neighbourhoods." https://osf.io/preprints/socarxiv/q87fu/.

Goodman, Anna, Anthony Laverty, and Rachel Aldred. 2020. "The Impact of Introducing a Low Traffic Neighbourhood on Fire Service Emergency Response Times, in Waltham Forest, London." *Findings*. https://doi.org/10.31235/osf.io/jathq.

London Fire Brigade. 2020. "Fire Facts: Incident Response Times." https://data.london.gov.uk/dataset/incident-response-times-fire-facts.

SUPPLEMENTARY MATERIALS

Supplementary Info

Download: https://findingspress.org/article/23568-the-impact-of-2020-low-traffic-neighbourhoods-on-fire-service-emergency-response-times-in-london-uk/attachment/59398.docx