



**Implementation of 20 miles per hour (mph) zone(s) within
Norwich:
Literature Search Summary**

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Introduction

Inappropriate and excessive speed on the roads accounts for approximately 1200 deaths per year in the United Kingdom (UK), two-thirds of all accidents occur on roads with a 30mph speed limit (Department of the Environment, Transport and the Regions (DETR), 1999 and Pilkington, 2000): this document summarises a literature search carried out to determine the efficacy of 20mph speed limit zones as a public health intervention.

In the UK current speed limits are usually 30mph on urban roads, 60mph on single carriageway roads and 70mph on dual carriageway roads: the first 20mph speed limit zone on urban roads was trialled in 1991 (Butcher, 2013). In 1999 an amendment was made to the Road Traffic Regulation Act 1984, which decentralised power to allow local authorities to establish and enforce 20mph speed limit zone(s) within their region (Butcher, 2013 and Pilkington, 2000). Currently, 20 mph speed-limit zones are widespread, with over 2,000 schemes in operation in England (DfT, 2013). The evidence-base, current UK policy and other examples of 20mph zones will be outlined in order to contextualise the feasibility of implementing 20mph zone(s) within the city of Norwich.

Evidence-base

A literature search was conducted to identify studies or articles relating to 20 mph speed limits; additional articles were identified by hand-searching cited references. A search-engine was used to retrieve government publications pertaining to UK legislation and policy on 20 mph speed limits, this will be outlined in the next section.

Most of the studies or articles evaluate the efficacy of 20mph speed limits by quantifying the changes in number of people killed or injured as a consequence of road casualties. There are differing severities of road casualties referred to within the literature and this document, the Department for Transport (DfT) definitions can be found below in Table 1.

Table 1: DfT grading of road casualties

| | |
|-----------------------|---|
| Fatal | Any death occurring within 30 days from causes arising out of the accident |
| Serious Injury | Casualties who require hospital treatment and have lasting injuries, but who do not die within the recording period for fatality, or experience the following injuries whether or not they are detained in hospital: fractures, concussion, internal injuries, crushings, non-friction burns, severe cuts and lacerations, severe general shock requiring medical treatment and injuries causing death 30 or more days after the accident |
| Slight injury | Casualties have injuries that do not require hospital treatment, or, if they do, the effects of the injuries quickly |

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Due to the nature of the intervention, literature search mainly yielded observational studies and articles analysing government data on road casualty trends. Key findings were:

- **A 20mph speed limit is associated with a reduction in road traffic casualties**

Department of the Environment, Transport and the Regions research shows that 20mph speed limit zones have a 60% reduction in the incidence of traffic accidents (DETR, 1996). Additionally, the chance of a pedestrian being killed or seriously injured (KSI) if struck by a car at 30mph is 45%, however at 20mph this is reduced to 5% (DETR, 1997).

These findings were supported by an observational study carried out by Grundy et al in 2009, based on analysis of geographically coded police data on road casualties from 1986-2006 in London. They found that the introduction of 20mph speed limit zones were associated with over 40% reduction in road casualties.

- **A reduction in road traffic casualties in areas adjacent to 20mph speed limit zones has been observed**

In the above study by Grundy et al it was noted that casualties fell by an average of 8.0% in areas adjacent to 20mph speed limit zones.

- **Child pedestrians are an at-risk group for road traffic casualties and benefit the most from 20 mph speed-limit zones**

The UK has one of the highest child pedestrian casualty rates within Europe, approximately 140 children are killed in road traffic accidents each year: this has been attributed to lack of speed restrictions (Pilkington, 2000). Department of the Environment, Transport and the Regions research shows that 20 mph speed limit zones reduce child pedestrian and cyclist accidents by 67% (DETR, 1996).

The Grundy et al in their 2009 observational study showed that the greatest reduction in KSI was amongst children.

- **Road traffic casualties are greater in areas of socioeconomic deprivation: targeting these areas with 20mph speed limit zones has the potential to reduce differentials**

It has been demonstrated that road traffic casualties demonstrate some of the widest socioeconomic differentials of any cause of morbidity or mortality (Edwards et al, 2006). In a similar study design to Grundy et al., Steinbach et al in 2011 studied the effect of 20mph speed limit zones across socioeconomic quintiles. They noted that the overall reduction in road traffic casualties was similar across the quintiles: there was a reduction of 41.8% in the least deprived quintile and a reduction of 38.3% in the most deprived quintile. However, due to the higher number of road

casualties there were a greater number of 20mph speed limit zones in the most deprived areas, therefore across all 20mph speed limit roads the underlying decline in road casualties was significantly less in the most deprived areas.

- **The recent rise in road traffic casualties in 20mph speed limit zones is likely to reflect that there are now more 20mph roads per kilometre (km)**

Recent figures from the Department for Transport show an increase in road traffic casualties on 20 mph roads: there was a 24% increase in serious-to-slight injuries and a 17% increase in fatalities from 2010 to 2011. However, the road traffic casualties on 30mph roads vastly exceeded this (DfT, 2011). Limb in a 2012 article cited Chris Grundy as attributing these to the increase in number of 20mph roads.

Wider benefits of a 20mph speed limit zone

Benefits of a 20mph speed limit zone, other than reduction in road traffic casualties, are summarised in table 2.

Table 2: Wider benefits of a 20mph speed limit zone

| |
|---|
| Quality of life benefits (DfT, 2013) |
| Community benefits and strengthened social networks (Appleyard, 1981 and Hart and Pankhurst, 2011) |
| Increased outdoor play and activity amongst children (Christie, 2007) |
| Reduced noise-pollution (DfT, 2013) |
| Encouragement of healthy and sustainable transport modes such as walking and cycling (Kirkby, 2002; Morrison, 2004 and Bristol City Council, 2011) |
| Environmental benefits from: |
| (i) Reduced fuel consumption due to driving at a slow and steady space |
| (ii) Reduced carbon emissions due to uptake of other transport modalities |
| (DfT, 2013) |

Limitations of a 20mph speed limit zone

The limitations of a 20mph speed limit zone are summarised in table 3. Financial estimates and cost-effectiveness as well as public perception will be addressed later in the document.

Table 3: Limitations of a 20mph speed limit zone

| |
|--|
| 20mph speed limits only lead to small reductions in traffic speeds, they are therefore most appropriate on roads where vehicle speeds are already low (DfT, 2013) |
| Initial financial cost of implementing a 20mph zone |
| No police enforcement of speed limit (DfT, 2013) |

UK Legislation and Policy

Key government legislation and publications pertaining to 20mph roads include: *Road Traffic Regulation Act (RTRA) 1984*; *Traffic Signs Regulations and General Directions (TSRGD) 1964 – 2002*; *20mph Speed Limits and Zones, 1999*; *Strategic Framework for Road Safety, 2011*; *Setting Local Speed Limits 2006 -2013* and *Roads: speed limits, 2013*.

Key points within UK legislation and policy include:

- *Setting Local Speed Limits* was revised in 2013 to place greater emphasis on the options available to local authorities to implement 20 mph speed limits on urban roads.
- Local authorities must be concordant with government guidance in devising speed limits as outlined in the DfT circular *Setting Local Speed Limits 2013*
- *Strategic Framework for Road Safety, 2011* states: “Local authorities are able to use their power to introduce 20 mph speed limit zones where (a) major streets where business on foot is more important than slowing down road traffic and (b) lesser residential roads in cities, towns and villages, particularly where this would be reasonable for the road environment, there is community support and streets are being used by pedestrians and cyclists. The evidence suggests that in residential streets, and in town centres where there is likely to be a conflict between vehicles and pedestrians, carefully implemented 20mph zones can contribute to an improvement in road safety.”
- *Setting Local Speed Limits, 2013* recommends that the appropriate type of roads for a 20mph speed limit are: “In streets that are primarily residential and in other town or city streets where pedestrian and cyclist movements are high, such as around schools, shops, markets, playgrounds and other areas, where motor vehicle movement is not the primary function.”
- *Setting Local Speed Limits, 2013* states that no point within a 20mph speed limit zone should be more than 50m away from a traffic calming measure.
- *Setting Local Speed Limits, 2013* states 20 mph speed limits and zones are usually self-enforcing. Compliance with the speed limit should be achieved with road conditions, traffic calming measures, signage and publicity. There should be no expectation on the police to provide additional enforcement, unless this has been agreed.

- Where speed cameras are used, the Association of Chief Police Officers (ACPO) 2013 Speed Enforcement Policy states at speed limits of 20mph there should be a tolerance upto 22mph, fixed penalty when education is not appropriate at 24mph, speed awareness if appropriate from 24mph to 31 mph and court summons above 35mph.
- The *RTRA 1984* states it is the duty of the traffic authority to erect and maintain prescribed speed limit signs on their roads; designs and conditions of usage of these are stipulated in the *TSRGD*. This is reinforced in *Setting Local Speed Limits 2013*.
- *The TSRGD 2002* stipulates a legal requirement to consult relevant stakeholders, e.g. the emergency services, local residents and organisations representing road users before implementing a 20 mph speed limit zone.

Towns and cities in the UK with a 20mph speed limit zone

20mph zones are widespread within the UK, local authorities with notable 20mph zone(s) include: Bath; Bishopbriggs; Bristol; Brighton & Hove; Cambridge; Darlington; Edinburgh; Glasgow; Hackney; Lancashire; Leicester; Liverpool; Middlesbrough; Newcastle-upon-Tyne; Oxford; Portsmouth; Sheffield; Warrington; Wirral and York. Additionally, within London the following boroughs have implemented 20mph zone(s): Camden; Islington and Southwark (Toy, 2012).

Portsmouth is often used as a case study within the literature on 20mph zones; this is as it is a good example of a large-scale 20mph zone in an urban area (DfT, 2013). 94% of the city's total road length was included (Toy, 2012). Additionally, they were the first local authority in the UK to enforce the speed limit using signs only and without traffic calming measures (Toy, 2012). This was appropriate as the traffic speeds on most of the streets were relatively low before the implementation of the 20mph speed limit. This intervention led to a 22% reduction in road traffic casualties, which was above the national reduction of road casualties in comparable areas (Atkins, 2010).

Cost-effectiveness and financial estimates of a 20mph speed limit zone

The cost of establishing a 20mph speed limit zone varies: schemes enforced by signage alone have been considerably cheaper than those utilising traffic calming measures. For example, in Portsmouth where signage was utilised alone the total scheme cost £0.57 million for a population of 200,000, whilst in Haringey where traffic calming measures were proposed the estimated cost was £10 million for a population of 225,000. Notably, the London Borough of Islington also utilised a signage only scheme at a cost of £1.6 million for a population of 200,000: the increased cost in comparison to Portsmouth was attributed to the lighting for the signs (Haringey Local Authority, 2011).

The savings made by the utilisation of signage only must be offset by their diminished efficacy in reducing speed. The Royal Society for the Prevention of Accidents in 2009 found that signage alone reduces speed by 1mph, road humps reduce speed by 10mph and speed cameras reduce speed by 20mph.

The cost of the intervention must be balanced against the savings incurred from the reduced road traffic casualties in 20mph zones: each road-traffic related death is approximated to cost the economy £1.5 million (Haringey Local Authority, 2011).

There are published studies that aim to evaluate the cost-effectiveness of 20mph zones. The first study by Peters in 2013, analysed the data from mandatory 20mph zones in two different ways: by cost-benefit analysis (CBA) an approach favoured by transport economists or the DfT as well as by cost-utility analysis (CUA) favoured by health economists or NICE. They found that in low casualty areas the intervention was not cost-effective regardless of approach utilised; whilst in high casualty areas the intervention was cost effective by CBA producing a saving of £90, 600, but not by CUA incurring a cost of £86, 500 per quality adjusted life year (QALY). This builds on research published by Grundy et al in 2008, whose CBA demonstrated that after 5 years the benefits of a 20mph speed limit zone exceed the costs in high casualty areas but not in low casualty areas. Steinbach et al in 2013 calculated cost-effectiveness by offsetting the cost of the intervention with the savings occurred from road traffic casualty prevention over a 5 and 10 year period: they found a saving of £18,947 after 5 years and £67 306 after 10 years in areas where there were high casualties. From the published data it is apparent that as an intervention 20mph zone(s) are cost effective when utilised in areas of high road traffic casualties.

Public perceptions of a 20mph zone

There is a widespread public support for the implementation of 20mph zones in residential areas, however this is contradicted by research which demonstrates that speeding is also accepted as a 'social norm': speeding is shown to be a complex psychological issue and there may be a disparity between the drivers attitude towards speeding and their own behaviour. A combination of habit, visual cues, and pressure from other drivers on the road may contribute to speeding even if the driver supports the idea of a speed limit (Toy, 2012).

Locally, there has been a recent media debate regarding the implementation of a 20mph speed limit zone in Norwich City Centre published in a regional newspaper, Eastern Daily Press. Stephen Hammond, Parliamentary Under Secretary for Transport stated that given the rise of road traffic casualties on 20mph roads he was not in support of a 20mph zone; In response to this Councillor Judith Lubbock, Lord Mayor of Norwich replied stating this was likely due to the increase in 20mph roads and reiterated her support of a 20mph speed limit in Norwich City Centre (Lubbock, 2014).

Regional data

The Road casualties in Norfolk: Baseline Evaluation Report 2013 highlights some key-trends in road casualties over a 5-year period regionally.

Findings pertinent to this document include:

Speed

- The highest proportion of road casualties in Norfolk occurred on roads where the speed limit was 30mph and 60mph
- The highest proportion of people KSI were within 60mph speed limits
- Within the five year period there were no fatalities within 20mph speed limits

This is supported by research that states for every 1 mph reduction in average speed, collision frequency reduces by around 5% (Taylor, Lynam and Baruya, 2000) as well as research highlighted earlier demonstrating lower speeds are associated with lower mortality and morbidity rates.

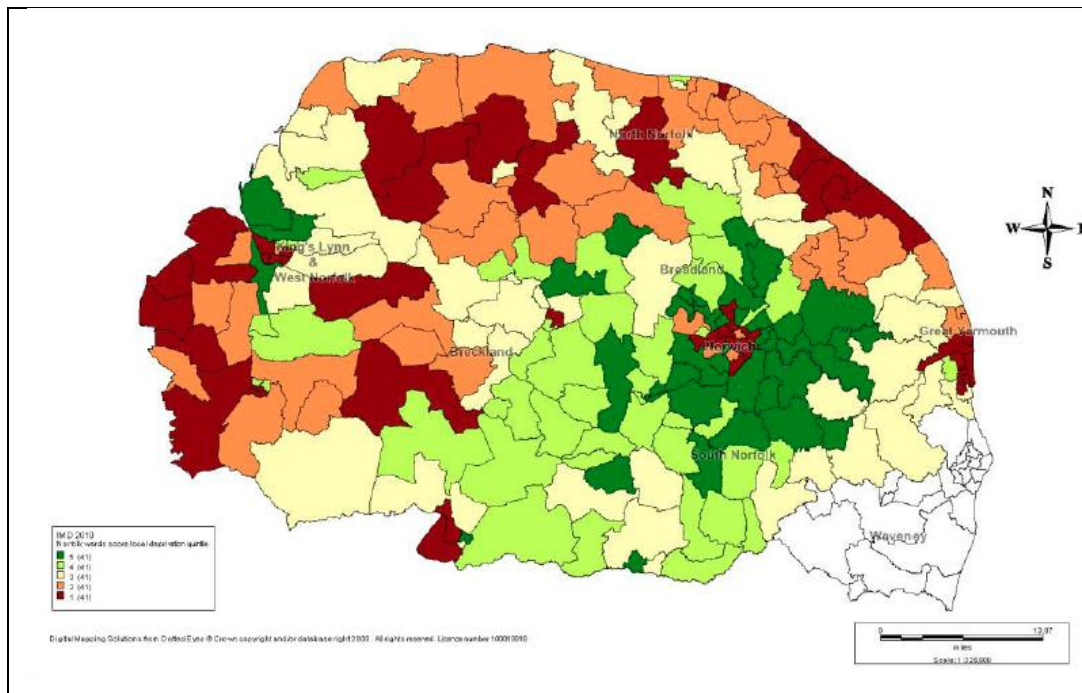
Age standardised rate of residents killed and seriously injured

- Within Norfolk, Norwich had the highest directly age standardised rate of residents KSI at 31.2 per 100, 000 which was significantly higher than the county average

Pedestrian road traffic casualties

- Within Norfolk, Norwich had the highest estimated crude rate of pedestrian KSI casualties at 11.4 per 100, 000 population
- There were significantly more pedestrian KSI from the most deprived quintiles

Figure 4: Weighted IMD 2010 score (local deprivation quintile) by ward for Norfolk



The above map shows that Norwich has several wards in the most deprived quintile.

Pedal cycle casualties

- Within Norfolk, Norwich had the highest crude rate of pedal cycle KSI casualties at 6.6 per 100, 000 population

Children

- Children are largely affected by road traffic casualties: there were 28 children KSI in Norfolk annually
- Child pedestrians account for 42.9% of child KSI and of these 45% occur from 3-5pm
- Children from lower socioeconomic were disproportionately affected: 68% of child pedestrian KSI were from either the most deprived or second most deprived quintile of areas

These figures highlight similar findings from DETR, Grundy et al and Pilkington outlined earlier.

Conclusion

The evidence demonstrates that at 20mph speed limit zones are beneficial at reducing the number of collisions and road casualties. However, as a public health intervention it is only cost-effective on high casualty roads. Additionally, implementation of these zones are most effective in areas where the average driver speed is already low.

Although there is good evidence for the efficacy of 20mph zones, in order to pay careful consideration to the possible size(s) and location(s) of any potential 20mph zone(s) in Norwich City Centre further information needs to be collated regarding identification of: (i) roads with high numbers of casualties; (ii) areas with a large proportion of child pedestrians and (iii) areas of socio-economic deprivation. This will allow for the creation of targeted 20mph zones, which are more likely to be effective. Information regarding the current average driver speed on any potential 20mph road would help to further plan whether signage only or traffic calming measures should be used as a method of enforcement.

Also further work will need to be carried out with gathering the opinion of local stakeholders and the general public.

References

- Appleyard D, 1981. *Livable Streets*. Berkeley: University of California Press
- Association of Chief Police Officers, 2013. *ACPO Speed Enforcement Policy Guidelines 2011- 2015: Joining Forces for Safer Roads*. London: ACPO
- Atkins Transport Planning and Management commissioned by DfT, 2010. *Interim Evaluation of the Implementation of 20 mph Speed Limits in Portsmouth*. Atkins: London
- Butcher L., 2013. *Roads: speed limits* (SN468). London: Business and Transport, House of Commons
- Bristol City Council, 2011. *20mph Speed Limit Pilot Areas: Monitoring Report*. Bristol: Bristol City Council
- Christie N, Ward H, Kimberlee R, et al., 2007. Understanding high traffic injury risks for children in low socioeconomic areas: a qualitative study of parents' views. *Injury Prevention*: 13
- Department of the Environment, Transport and the Regions (DETR), 1996. *Review of traffic calming schemes in 20mph zones* (circular 05/99). London: DETR
- DETR, 1997. *Road safety strategy: current problems and future solutions*. London: DETR
- DETR, 1999. *20mph speed limits and zones* (Traffic Advisory Leaflet 09/99). London: DETR
- Department for Transport (DfT), 2010. *Reported Road Casualties Great Britain 2010: Annual Report*. London: DfT
- DfT, 2011. *Reported Road Casualties Great Britain 2011: Annual Report*. London: DfT
- DfT, 2011. *Strategic Framework for Road Safety*. London: DfT
- Department for Transport and Parliamentary Under Secretary of State, 2013. *Setting local speed limits* (Ref: DfT 01/2013). London:DfT
- Edwards P, Roberts I, Green J, et al., 2006. Deaths from injury in children and employment status in family: analysis of trends in class specific death rates. *The BMJ*, 333
- Grundy C, Steinbach R, Edwards P, et al., 2009. The effect of 20 mph traffic speed zones on road injuries in London, 1986-2006: a controlled interrupted time series analysis. *The BMJ*, 339/b4469
- Haringey Local Authority, 2011. *Scrutiny Review – 20mph Speed Limit*. Haringey: Haringey Local Authority

Hart J and Pankhurst G., 2011. Driven to excess: Impacts of motor vehicles on the quality of life of residents of three streets in Bristol, UK. *World Transport Policy and Practice*, 17/2: 12-30

Kirkby, T., 2002. *Memorandum by Kingston upon Hull City Council (RTS 152) – 20 mph zones in Kingston upon Hull*. Select Committee on Transport, Local Government and the Regions: Kingston

Limb, M., 2012. Researchers defend 20mph speed limits despite rise in casualties. *The BMJ*, 345/e5580

Lubbock J., 2014. 20's Good [blog] (cited in September 2014) Available at: <http://judithlubbock.mycouncillor.org.uk/>

Morrison DS, Avineri E, Fulcher E, et al., 2004. Evaluation of the health effects of a neighbourhood traffic calming scheme. *Journal of Epidemiological Community Health*, 58

Peters, JL., 2013. The cost-effectiveness of mandatory 20mph zones for the prevention of injuries. *Journal of Public Health*, 35/1

Pilkington P., 2000. Reducing the speed limit to 20mph in urban areas: child deaths and injuries would be decreased. *BMJ*, 320/7234

Road Casualty Reduction Group – Data Sub-group, 2013. *The Road casualties in Norfolk: Baseline Evaluation Report 2013*. Norwich: Norfolk County Council

Road Traffic Regulation Act (RTA) 1984. London: HMSO

Steinbach R, Grundy C, Edwards P, et al., 2011. The impact of 20mph traffic speed zones on inequalities in road casualties in London. *Journal of Epidemiology & Community Health*, 65/10: 921-6

Steinbach R, Cairns J, Grundy C, et al., 2013. Cost benefit analysis of 20mph zones in London. *Injury Prevention*, 19/3: 211-213

Taylor MC, Lynam DA and Baruya A., 2000. *The Effect of Drivers' Speed on the Frequency of Road Accidents*. Crowthorne: Transport Research Laboratory

Traffic Signs Regulations and General Directions (TSRGD) 2002. London: HMSO

Toy, S., 2012. *Delivering soft measures to support signs-only 20mph limits*. Bristol: Bristol Social Marketing Centre, University of West England.