Executive summary

Introduction

In July 2014, Atkins, AECOM and Professor Mike Maher of University College London, were commissioned by the Department for Transport to evaluate the effectiveness of 20mph (signed only) speed limits, based on twelve case study schemes in England and various comparator areas with a 30mph limit in place.

The purpose of the research is to:

- examine the perceptions and attitudes of different user groups towards 20mph speed limits;
- strengthen the evidence base regarding the effectiveness of 20mph limits;
- inform future policy development on 20mph speeds and limits at a national and local level;
- identify lessons learned regarding the implementation and monitoring of 20mph signed only speed limits, to guide local authorities considering introducing 20mph limits.

The study comprises a **process evaluation** which looks at why and how case study schemes were delivered, and an **impact evaluation** which examines the effectiveness of schemes in delivering intended outcomes.

This report presents the headline findings and conclusions based on a broad range of quantitative and qualitative data sources. Further detail on the methodology, data sources and analysis undertaken is provided in the technical report.

Policy and legislative context

In 1999, the Road Traffic Regulation Act 1984 was amended to allow local authorities to designate 20mph speed limits without the prior approval of the Secretary of State.

In 2013, DfT provided revised guidelines on the **Setting Local Speed Limits** (**DfT Circular 01/2013**), encouraging traffic authorities to consider introducing more 20mph limits over time, and over a larger number of roads. It states that where there is expected to be a positive effect on road safety and a generally favourable reception from local residents, traffic authorities are able to use their powers to introduce 20mph speed limits on major streets where foot and cycle movements are important, and on residential streets where the characteristics of the street are suitable. It advises that 20mph limits are most appropriate where the mean speed is already at or below 24mph; and states that speed limits should encourage self-compliance with no expectation of additional police enforcement.

There has been a substantial growth in the implementation of area-wide limits in recent years, in response to the guidance.

Methodology

The overall approach is based on evidence from twelve ('core') case study schemes, comprising a variety of area types, road types, and scale:

Category	Case Study schemes	
Predominantly residential schemes – small scale standalone, covering an individual neighbourhood (two schemes):	Walsall (Rushall)	Winchester (Stanmore)
Predominantly residential schemes – large scale area-wide schemes, covering a substantial portion of the town or city in question (eight schemes):	Liverpool (Area 7) Liverpool (Area 2) Middlesbrough Calderdale (Phase 1)	Nottingham (Bestwood) Brighton (Phase 2) Portsmouth Chichester
City or town centre and adjacent residential areas (two schemes):	Brighton (Phase 1)	Winchester (City Centre)

The schemes involved lowering the speed limit from 30mph to 20mph through signing and road markings, and supporting community engagement activities to raise awareness and encourage support. None of the schemes involved the introduction of physical traffic calming measures or changes to the street design.

Eleven of the schemes were implemented between March 2012 and June 2015. The twelfth scheme was implemented before 2010, allowing the longer-term trend in speed performance to be observed.

A further three case studies cover local authorities that have chosen not to implement a 20mph limit scheme ('no schemes'), and are used to understand the barriers and considerations behind such decisions. In addition, three comparator areas are used to identify background trends in speeds on 30mph roads with similar characteristics to the 'core schemes'; and regional-based data is used to identify background trends in collisions and casualties on similar 30mph roads.

The evaluation is based on the following evidence sources:

- Questionnaire surveys with 2,170 residents living in or near the new 20mph limits (drivers and non-drivers); 1,256 drivers living outside the case study areas (non-resident drivers); and 1,655 cyclists and 352 motorcyclists nationwide.
- In-depth interviews with 177 non-resident drivers.
- Nine focus groups with residents and specific user groups (cyclists, young drivers, parents).
- Interviews with 60 local stakeholders (officers, councillors, police, health, bus operators, interest groups).
- Analysis of speed outcomes based on GPS vehicle data (measuring area-wide journey speeds) covering over 700kms of new 20mph (signed only) limits, and spot speed data (measuring instantaneous speeds).
- Analysis of safety outcomes based on DfT road accident statistics (STATS19) data.

The study has not sought to collect primary data on wider impacts relating to the local economy, the environment and health.

Why and how were 20mph limits introduced?

Interviews with stakeholders indicate that the key motivations behind the case study schemes can be categorised as transport-related, community or political, and health-related; with most schemes driven by a combination of these factors.

Transport-related	• Casualty reduction • Reduce rat running through residential areas • Reduce the negative impact of cars in urban centres (congestion, pressure on parking availability, severance issues, poor walking / cycling environment, poor air quality).
Community or politically driven	• Community concerns about speeds, safety and the quality of the environment • Community pressure on the Council (bottom-up approach) • Councillor-led. Seen as a low cost initative to deliver improvements for local residents.
Health-related	• Encourage active travel (walking and cycling) • Improve 'health and wellbeing'

In general, 20mph limit schemes provide an opportunity to address a wide range of policy areas in what is perceived to be a low-cost manner. The majority of schemes therefore have a range of objectives which span road safety, promotion of active travel modes, perceived quality of the environment, health and well-being, and community benefits. The most common objectives are focused around community and health themes. Accident reduction is not a key driver behind many of the case study schemes.

Local authority stakeholders were asked to identify and rank enablers and barriers which affected the extent to which schemes were delivered to the anticipated quality, programme, and cost, and were accepted by the public. Early engagement and buy-in from stakeholders was the most frequently mentioned enabler as this helps to minimise objections from the local community and businesses, secure support in scheme delivery from potential partners, enables the scheme to be delivered quickly, and increases public acceptance of the new limit. The most frequently mentioned barrier was 'limited funding and staffing resources', for design, delivery and post implementation activities (engagement, enforcement-related interventions, and monitoring).

20mph schemes have the potential to deliver a wide range of transport and other benefits. This provides an opportunity for scheme promoters to work and engage with a range of policy and interest groups; and the most effective schemes are likely to be those which are based on a broad integrated policy agenda (involving health, environment, urban planning, emergency services, education, community representatives, etc.). Longer-term 20mph schemes which are supported by complementary policies and interventions are likely to deliver greater benefits.

Is there support for 20mph limits?

The study examines the level of support for 20mph (signed only) limits amongst different user groups through the questionnaire surveys. This shows high levels of post implementation support amongst cyclists (81%), residents (75%), and non-resident drivers (66%); but less support amongst residents in neighbouring 30mph areas (44%) and opposition from motorcyclists (29% supportive, 47% unsupportive).There was also little call for the limit to be changed back to 30mph (12% support amongst residents and 21% amongst non-resident drivers).

Net support (% saying 'good idea' - % saying 'bad idea') amongst residents increased significantly after the implementation of the schemes (from +58% to +63%)[1], suggesting that some pre-implementation concerns did not materialise or became more acceptable.

The most common area of concern across all user groups considered was around compliance, with most focus group and survey participants of the opinion that stronger enforcement measures are needed if 20mph limits are to be effective.

How have speeds and driver behaviour changed?

To what extent do drivers comply with the limit? – Evidence from the journey speed analysis shows that following implementation, 47% of drivers in residential areas and 65% of drivers in city centre areas (equating to 51% across both categories) complied with the new 20mph limit, travelling at speeds of less than 20mph. Whilst a substantial proportion are exceeding the limit, the majority are travelling at less than 24mph (i.e. at speeds close to 20mph): 70% in residential areas and 85% in city centre areas.

The nature of the roads where the limits have been introduced means that lower speeds were already 'self-enforced'. Reducing the speed limit to 20mph has helped reinforce this process. There are now slightly more drivers travelling at speeds of less than 24mph (+5 percentage points in residential areas, and +7 percentage points in city centre areas), suggesting faster drivers have slowed down.

How has the profile of speeds changed? – The journey speed analysis shows that the median speed has fallen by 0.7mph in residential areas and 0.9mph in city centre areas. Faster drivers have reduced their speed more, with the 85th percentile speed[2] falling by -1.1mph in residential areas and by -1.6mph in city centre areas, based on journey speed data. This is a key finding, as other research shows that higher speeds are associated with increased safety risk (more collisions, increased severity, perceptions that the environment is not safe for vulnerable users).

The overall change in speeds is greater where speeds were faster before. The median speed fell by -1.3mph on residential roads with a before speed of more than 24mph; and by -1.1mph on 'important local roads'[3] which typically had higher before speeds. On 'minor local roads' the median speed was already below 20mph and dropped by just 0.1mph.

[1] % saying 'good idea' increased from 71% to 75%,

[2] This is the speed that 85 percent of vehicles do not exceed.

[3] Case study roads have been classified as 'minor local roads', 'important local roads', and 'major strategic roads' using TomTom's Functional Road Classes, which provides a proxy for the size, nature and purpose of each road.

The results suggest that road characteristics have a much larger impact on the speeds that drivers choose to adopt than whether the road has a 30mph or 20mph limit. The differences in speed between the different road categories are far larger than the changes brought about by lowering the speed limit.

Bigger changes were recorded at individual spot speed sites, with the change in mean speed varying from -7.2mph (reduction) to +4.3mph (increase); and the change in 85th percentile speeds varying from -9.0mph (decrease) to +7.6mph (increase).

The reductions in average speed in the case study areas are similar to those observed in other research studies, which have reported reductions in average speed of 0.5-2mph (with varying accountability for background trends).

What evidence is there of a 20mph limit impact? – Statistical analysis shows a significant reduction in speeds, relative to similar 30mph comparator areas, for 'important local roads' in residential areas and for an aggregation of all road types in city centre areas:

- The relative change on important local roads in residential areas is estimated at -0.8mph for the median speed and -1.1mph for the 85th percentile speed.
- The relative change across all roads in city centre area, is estimated at -0.6mph for the median speed, and -1.0mph for the 85th percentile speed.

The findings suggest that the absolute changes in speed observed in the case study areas are partly due to the implementation of 20mph limits, but also reflect background trends in speed on urban roads.

How have speeds on neighbouring roads changed? – Journey speed analysis shows a small decline in speeds on surrounding 30mph and 40mph roads across the case study areas; suggesting that in general, drivers are not trying to make up for lost time when leaving a 20mph limit area.

What do residents and drivers say? – The majority of resident (about two-thirds) and non-resident drivers (just over half) have not noticed a reduction in the speed of vehicles, and do not perceive there to be fewer vehicles driving at excessive speeds for the area. This is not surprising as the actual reduction in speed has been small. However:

- Most resident drivers (72%) and non-resident drivers (69%) agreed that the 20mph limit makes it more acceptable to drive at a lower speed.
- A net proportion (% agree - % disagree) of non-resident drivers (+44%) and resident drivers (+7%) agreed that 20mph limits increase driver awareness of potential risks and hazards.

What factors influence speed compliance?

Lack of enforcement and lack of concern about the consequences of speeding were identified as the primary reason for non-compliance in driver interviews and the various focus groups. There is a widespread view amongst the public that 20mph limits are not enforced, and the likelihood of being caught exceeding the limit is very small; and this is one reason why bigger reductions in speed have not been observed in scheme areas.

Factors associated with compliance included the nature of the road environment, presence of vulnerable users, discussion within the community about road safety, and drivers with children.

What are the perceptions about walking and cycling in 20mph limits?

Overall, 20mph limits are perceived to be beneficial for cyclists and pedestrians:

- 69% of residents agreed that the 20mph limits are beneficial for cyclists and pedestrians;
- 74% and 77% of non-resident drivers agreed that the 20mph limits are beneficial for cyclists and pedestrians respectively; and
- 69% and 89% of existing cyclists (nationwide) agreed that 20mph limits are beneficial for cyclists and pedestrians respectively.

Focus group discussions suggest that these views are driven by perceptions about the potential safety benefits of slower vehicle speeds, rather than because drivers have been seen to be more considerate to pedestrians and cyclists.

The discussions also suggest that slower speeds are seen as only one of a combination of factors required to improve the environment for walking and cycling. In the case study areas, there continues to be a range of barriers which discourage walking and cycling; and for many drivers' time constraints, journey distance, and a general preference for driving are also important considerations.

How have collision and casualty rates changed?

What has been the change in residential areas? – The comparator analysis indicates that there is insufficient evidence to conclude that there has been a significant change in collisions and casualties following the introduction of 20mph limits in residential areas, in the short term (based on the post implementation data available to date). Although the absolute number of collisions and casualties (per km, per year) has reduced in the residential areas, there has also been a reduction in the corresponding 30mph comparator areas.

Collision and casualty rates are known to fluctuate from year to year. Some of the analysis is based on small subsets of the data (particularly for collisions involving pedestrians, cyclists, children and older persons), and the post implementation data currently available may not be indicative of the longer term trend. Repeating the analysis in a couple of years' time, when more case study data is available, may (or may not) show a significant change.

What has been the change in city centre areas? – The comparator analysis shows that Brighton Phase 1 is the only case study area where the change in collisions and casualties, relative to the 30mph comparator area is significant. The results show a significant reduction in overall collisions (-18%), overall casualties (-19%), pedestrian casualties (-29%), and casualties aged 75 or over (-51%). However, there is no evidence to indicate a significant change in casualties involving cyclists and under 16s, at this time.

The changes appear to be a reflection of the city characteristics; and the blanket implementation of 20mph limits across all roads within the scheme area, including higher flow A and B roads which have typically been excluded from the residential case study schemes. There has been a significant reduction in collisions across all road types, but the change has been most pronounced on major strategic roads.

Overall findings – The evidence available to date shows no significant change in the short term in collisions and casualties, in the majority of the case studies (including the aggregated set of residential case studies).

There is some evidence to suggest a positive 20mph impact in one location (Brighton Phase 1), where a blanket 20mph limit was introduced covering both major and minor roads, and where there is sufficient data to indicate a statistically significant change in collisions and casualties relative to the 30mph comparator area. It should be stressed that this represents just one case study, and the extent to which the findings are transferable to other locations is unclear.

In both cases, further data is required to determine the longer term impact of 20mph limits. Collision and casualty rates are known to fluctuate from year to year, and the post implementation data currently available may not be indicative of the longer term trend.

How have route choice and journey times changed?

How has route choice changed? – Despite some evidence of driver frustration, only 8% of (non-resident) drivers said that they avoided driving in the area, and only 4% of residents felt that there are fewer vehicles using their road. Even with the lower speed limit, in most cases the 20mph roads still appear to provide a more direct and convenient route. The vast majority of drivers do not appear to have changed their route to avoid the new 20mph limit areas.

How have journey times changed? – Journey times are estimated to have increased by 3% in residential areas and 5% in city centre areas, based on the observed change in median speed (from journey speed data). This adds less than half a minute to a two mile trip and less than a minute to a five mile trip. Most drivers are unlikely to notice this level of change. Furthermore, a substantial proportion of drivers were already travelling at less than 20mph, and are unlikely to have experienced a change in their journey times.

How has mode use changed?

Has use of active travel modes changed? – There has been a small (but significant) increase in the proportion of survey respondents stating that they have increased their use of active travel modes. Some

5% of residents surveyed said that they are walking more, and 2% said that they are cycling more, since the introduction of the 20mph limits.

In addition, a small proportion of households with children reported that their children are cycling locally more often since the introduction of 20mph limits (9% of households for children aged 6-10 years, 6% of households for children aged 11-14, and 6% of households for children aged 15-17).

Furthermore, the speed limits are expected to reinforce cycling behaviour amongst existing regular cyclists: 59% of those responding to the cyclists' online survey said that keeping the traffic below 20mph means that they are more likely to cycle to local places.

What is the likelihood of mode shift away from car? – A significant minority of residents said that keeping traffic below 20mph makes it more likely they will walk (16%) or cycle (9%) to local places rather than use the car. Actual mode shift activity is likely to be much less prevalent, but cannot be determined from this data. Changes may occur over time, as a result of the cumulative effect of other sustainable travel interventions or changes in individual circumstances.

What impact do 20mph limits have on the community, local economy, environment and heath?

Social and community impacts – The majority of residents (70%) agreed that the 20mph speed limit is beneficial for residents. However, child safety still appears to be a concern, and other potential benefits relating to social interaction (residents out and about on the street) and community pride do not appear to be recognised by the majority of residents. Some 7% of households with children aged 6-10 years and 5% of households with children aged 11-14 reported that their children play outdoors more often since the introduction of 20mph limits.

Local economy – Very few residents (3%) believed that the new speed limit means that people are avoiding the area and are less likely to use local shops and amenities.

Environment and health – No primary data on air quality, greenhouse gas emissions, noise levels, or health has been collected as part of this study.

How do outcomes compare with 20mph zones and older limits?

Some case study roads where the speed limit changed from 30mph to 20mph already had traffic calming in place, in the form of speed humps / tables or chicanes. These have essentially become new 20mph zones. In addition, almost all of case studies had the some pre-existing 20mph limits (signed only and with calming) in place prior to the implementation of the main area-wide scheme; often located outside schools. These roads did not experience a change in limit over the course of the research, but driver behaviour may have been influenced by the introduction of a new 20mph limit over the wider area.

Post implementation of 20mph limits, there is a higher level of compliance on already traffic calmed roads (62%), older 20mph limits (with calming) (66%), older 20mph limits (signed only) (68%); than on new 20mph (signed only) roads (47%).

Extending the area covered by 20mph limits has not changed driver behaviour on adjacent older 20mph limits (with traffic calming), but it appears that there has been some reduction on adjacent older 20mph limits (signed only). It is possible that the presence of calming (road humps, chicanes) and the nature of the associated roads (which are nearly all minor local roads) has already encouraged drivers to reduce their speed as much as they are willing to do so, in the absence of more proactive enforcement. However, on older 20mph limits (signed only) drivers may have been encouraged to reduce their speeds further, in line with their behaviour on new 20mph limits. The sample size for older 20mph limits is smaller than for the other categories of road, and further evidence is needed to support this conclusion.

Conclusions and considerations for decision-makers

This study substantially strengthens the evidence base on perceptions, speed and early outcomes associated with 20mph (signed only) limits. It is the only major UK study to date to consider multiple case study areas and provide a national view.

Local authorities have responded positively to revised guidelines on the setting of local speed limits (DfT Circular 01/2013), resulting in a substantial growth in signed only 20mph area-wide limits in recent years, covering larger areas and often entire urban areas. The majority of 20mph limits have been implemented on roads where the average speed prior to implementation was typically less than 24mph; and the case studies have generally been implemented on the basis that they should be self-enforcing, with no expectation of additional police enforcement.

Based on the findings of this study, the guidance set out in DfT Circular 01/2013 remains broadly valid. However, consideration should be given to encouraging traffic authorities to work with relevant partners from the police, health, environment, urban planning, education, and the local community to deliver 20mph limits as part of an integrated approach to addressing transport, community, environment and health objectives.

The guidance also needs to recognise the concern amongst the public regarding the apparent lack of enforcement, and the general view that the likelihood of being caught exceeding the limit is very small. Where a more proactive enforcement approach by the police is not practical, authorities should be encouraged to consider alternative approaches (e.g. community-based initiatives, use of vehicle activated signs, etc.), which may still require low level involvement of the police.

It is acknowledged that the current guidance is likely to lead to a mix of approaches across the country in terms of speed limits in built up areas, which creates a challenge in terms of embedding a culture of slower speeds in residential and pedestrian environments, and achieving driver compliance where 20mph limits are in place. There may therefore be broader reasons for strengthening the guidance whilst recognising that authorities retain the responsibility for setting speed limits on their roads.

12. Conclusions and considerations for decision-makers

12.1. Introduction

This study substantially strengthens the evidence base on perceptions, speed and early safety outcomes associated with 20mph (signed only) limits. It is the only major UK study to date to consider multiple case study areas and provide a national view. It combines evidence from 12 case study schemes comprising over 700kms of new 20mph (signed only) limits and uses data from comparable locations where 20mph limits have not been introduced to control for background trends. It brings together a wide range of qualitative and quantitative material, to provide robust evidence on observed and perceived outcomes following the implementation of 20mph (signed only) limits.

Feedback from over 5,400 questionnaires with a range of road users is used to identify perceptions about 20mph limits and changes in personal driving / riding behaviour. Analysis of speed outcomes is based on over 18 million vehicle kilometres of journey speed data from in-car GPS devices, and spot speed (instantaneous speed) data from over 400 locations. Just under 4,000 collisions have been analysed to examine early safety outcomes in 20mph limit areas. Evidence on mode use impact is based on self-reported behaviour change identified through questionnaire surveys and an investigation of associated factors.

This study has not sought to collect primary data on wider impacts relating to the local economy, the environment (greenhouse gas emissions, air quality, noise) and health. Existing empirical evidence is weak, inconclusive, or complex (particularly regarding air quality) and there remains an evidence gap regarding the impact of 20mph limits on these areas.

In summary, this study provides substantial new evidence on the implementation of 20mph limits, their effectiveness in a range of contexts, and lessons and considerations for policy and decision-makers. The key findings and conclusions in relation to each of these issues are set out below.

12.2. How has Circular 01/2013 been implemented?

In 2013, DfT provided revised guidelines on the setting of local speed limits (DfT Circular 01/2013). The guidance says that authorities can set 20mph speed limits in areas where local needs and conditions suggest that the current limit is too high. Traffic authorities are asked to have regard to this guidance, but it is not mandatory. Instead, it is about empowering local highways authorities and local people to make decisions that take into account local circumstances and needs. The key themes set out within the guidance are identified Table 8, along with a summary of the local authority response. In general, local authorities have responded positively to the guidance and largely followed the guidelines set out in the document.

Table 8. Local authority response to Circular 01/2013 in case study areas

Guidance theme	Local authority response
Consider more 20mph limits, over a larger number of roads where mean speeds are already at or below 24 mph on a number of roads (para 97)	**Substantial growth in area-wide limits in recent years, covering larger areas and often entire urban areas.** Over the last few years a large and growing number have implemented area-wide 20mph limits. In 2016, the Department for Transport asked all local authorities to provide details of the length of road with a permanent 20mph limit (signed-only or with physical calming) in their local authority area. Across the 39 authorities responding, the length of 20mph road had increased from 1,474kms in 2010 to 4,787kms in 2015, an increase of 225%[43].

[43] The local authorities with the greatest coverage of 20mph limits were: Sefton (800kms in 2015); Wigan (750kms in 2015); Nottingham (580kms in 2015); Southwark (336kms in 2015); Camden (258kms in 2015). Some authorities with greater coverage may not have responded.

	A survey by Brake in June 2015[44] estimated that 21% of councils in Great Britain had introduced widespread signed-only 20mph limits or made a commitment to do so, and a further 36% had limited trials in place. However, 43% had no area-wide limits in place or plans for such schemes. This proportion is believed to have decreased in recent years, but further data is required to confirm this. Knowledge gained through the course of this research suggests that the majority of 20mph limits implemented are focused on residential areas, but a substantial number of town and city centre schemes have also been implemented. **However, not all local authorities are implementing 20mph limits.** Although a substantial proportion of local authorities have implemented area-wide 20mph limits, some have chosen not to (estimated at less than half, based on the above evidence). Feedback from three case study authorities which have made a decision not to implement 20mph limits suggests that these decisions have been driven by lack of definitive proof about the tangible benefits of schemes, and opposition from the local community and local councillors. The Councils concerned were not able to provide evidence to clearly demonstrate the scheme rationale, objectives and outcomes, and ultimately were not able to secure buy-in from key stakeholders.
Most appropriate where the mean speed is already at or below 24mph (para 95)	**The majority of 20mph limits have been implemented on roads with average vehicle speeds below 24mph.** Circular 01/2013 suggests that where mean speeds exceed 24mph the introduction of signage only is unlikely to lead o compliance, and 20mph limits are therefore most appropriate where the mean speed is already at or below 24mph. Spot speed data shows that 86% of roads in the pioneering Portsmouth scheme (which formed the basis for the guidance set out in Circular 01/2013) had a mean before speed below 24mph. The rest of the case studies were implemented more recently and typically included a lower proportion of roads with before mean speeds below 24mph, varying from between 20% and 72% and equating to 59% overall. However, the number of sites surveyed in these areas was substantially less than in Portsmouth and known to be biased towards sites where higher speeds were expected. The actual proportion with a before mean speed below 24mph, taking all roads into account, is therefore likely to be higher. Some authorities reported that they had decided to include streets with higher limits to avoid isolated 30mph roads and to provide consistency in signage and road user perceptions. Others deliberately excluded streets with average speeds of more than 24mph or with known speeding issues.
Consider introducing 20mph limits on major streets (as well as residential streets) where foot and cycle movements are important and this outweighs the disadvantage of longer journey times for motorised traffic (para 84)	**Major streets excluded from a number of schemes** The area-wide residential case studies considered within this study typically exclude major streets such as strategic routes (A and B-class roads), key bus routes, distributor roads, and streets with non-residential frontages. In some of these locations, the road's function and the mix of traffic it carries means that motor traffic is the primary consideration. However, the two city centre case study schemes both comprise a blanket 20mph limit, which includes more strategic A and B-class roads with higher traffic flows, giving more importance to pedestrian and cycle movements across the entire area. It is interesting to note that in these particular case studies, the average before speed was less than in the residential case study areas[45].

12.3. How effective have 20mph limits been?

Level of support – The study shows that 20mph limits are generally supported and there is little call for the limit to be changed back to 30mph; even though most residents and users do not perceive vehicle speeds to have changed. Local residents and other road users generally perceive the 20mph limits as beneficial for local residents, pedestrians and cyclists. From a driver perspective, they make driving at a slower speed more acceptable.

Speed outcomes – Journey speed analysis (based on in-car GPS data) shows that in the case study areas, the majority of drivers are travelling less than 24mph (i.e. at speeds close to 20mph): 70% in residential

[44] Brake (2015); *GO20 Towards changing the default urban speed limit to 20mph. Information was requested from all 206 local traffic authorities in Great Britain, of which 122 replied.*

[45] It appears that the presence of congestion, pedestrian and cyclists, crossing points, parking and buses, may have influenced the speed at which drivers were able or chose to drive in city centre areas, with 59% already driving at less than 20mph.

areas and 86% in city centre areas. This represents a small increase on the before situation: 65% in residential areas and 79% in city centre areas. The nature of the roads where the limits have been introduced means that in many cases lower speeds were already 'self-enforced'. Reducing the speed limit to 20mph has helped reinforce this process.

Following the introduction of 20mph limits (signed only) the median speed has fallen by just under 1mph, with faster drivers reducing their speed more. The evidence suggests that this is partly due to the implementation of 20mph limits, but also reflects background trends in speed on urban roads.

- In residential case study areas, the introduction of 20mph limits is estimated to have resulted in a 0.8mph reduction in median speeds and a 1.1mph reduction in 85th percentile speeds[46] on 'important local roads'[47].
- In city centre case study areas, the analysis shows a 0.6mph reduction in median speeds and a 1.0mph reduction in 85th percentile speeds.

These figures are in addition to a small background reduction in speeds which appears to have occurred on urban roads with similar characteristics to the case study areas.

These findings are broadly consistent with previous research[48] which reports reductions in mean speed of 0.5mph-2.0mph based on instantaneous spot speed data[49], and with variable accounting for background trends. The modest scale of speed reduction is not surprising, as a substantial proportion of drivers were already travelling at speeds close to 20mph prior to the introduction of the new limits. The fact that faster drivers have reduced their speed more is encouraging as other research shows that higher speeds are associated with increased safety risk (more collisions, increased severity, and perceptions that the environment is not safe for vulnerable users.

The study has shown that the speed at which people drive is influenced more by the look and feel of the road, than whether a 20mph or 30mph limit is in place. It appears that some roads where 20mph limits have been implemented are naturally 'self-explaining roads' where drivers 'instinctively' drive more slowly (because their length provides less opportunity to build-up speed, visibility may be limited, drivers do not feel that they have sufficient space to drive faster or feel that it is appropriate to do so, and because they serve local start/end destinations only). In other cases, the look and feel of the road naturally encourages higher speeds. In many cases the implementation of a 20mph limit has simply formalised existing behaviour.

The challenge is how to change driver attitudes and behaviour in other locations. Evidence from this study (and others[50]) shows that bigger speed reductions occur on faster roads, with higher volumes of traffic and providing a locally important strategic function. Circular 01/2013 encourages authorities to consider introducing 20mph limits on more major streets where foot and cycle movements are important, but also advises that where average speeds exceed 24mph, the introduction of signage only is unlikely to lead to 20mph compliance. This study supports this advice and confirms that on faster roads more needs to be done to achieve compliance and maximise the benefits. Even on these types of roads the actual reduction in speeds has been small, with lowering the speed limit using signs alone leading to a reduction in speed of about 1mph. Without supporting measures to encourage compliance, there is a risk that non-compliance with the speed limit becomes the norm.

Introducing physical traffic calming or changing the design of the streets represents one approach to improving compliance. However, more realistically it needs to be about changing how drivers think about driving in residential areas and locations with significant pedestrian and cycle activity. This is likely to require high profile and integrated engagement activity. 20mph schemes have the potential to deliver a range of transport and other benefits (particularly relating to health and community). This provides an opportunity for scheme promoters to work and engage with a range of policy and interest groups to reinforce messages

[46] The 85th percentile speed is the speed that 85 percent of vehicles do not exceed. Only 15 percent of vehicles go faster than this speed, and 85 percent go at or below this speed. It is regularly used in traffic engineering as a standard to set safe speed limits and in the design of roads.

[47] Case study roads have been classified as 'minor local roads', 'important local roads', and 'major strategic roads' using TomTom's Functional Road Classes, which provides a proxy for the size, nature and purpose of each road.

[48] E.g. Burns A, et al. (2001), Atkins (2010), Bristol City Council (2012), Edinburgh City Council (2013), and Pilkington et al. (2018).

[49] Spot speed surveys generally record higher average and 85th percentile speeds as they measure instantaneous speed at a specific location.

[50] Pilkington et al. (2018).

about the rationale and potential benefits of 20mph limits. The most effective schemes are likely to be those which are based on a broad integrated policy agenda (involving health, environment, urban planning, emergency services, education, community representatives, etc.). Longer-term 20mph schemes which are supported by complementary transport, health, environment and community policy and interventions are likely to deliver greater benefits.

Enforcement – Although 20mph limits are intended to be self-enforcing, policy makers need to acknowledge that the most common area of concern amongst the public was around compliance, with most focus group and survey participants of the opinion that stronger enforcement measures are needed if 20mph limits are to be effective. There is a widespread view amongst the public that 20mph limits are not enforced, and the likelihood of being caught exceeding the limit is very small. This is one of the reasons why bigger reductions in speed have not been observed in scheme areas.

Feedback from the case study authorities suggests that what the police say about enforcement is can be important in terms of how 20mph limits are perceived by the local community.

Early safety outcomes – There is an established positive relationship between vehicle speed and injury collisions[51] – the higher the speed, the more collisions and where collisions do occur, the higher the risk of a fatal injury at higher speeds. The spread of speeds, and proportion of vehicles driving above the speed limit is also important.

However, based on the evidence available to date, this study has found no significant change in collisions and casualties, in the short term, in the majority of the case study areas (including the aggregated set of residential case studies). While some individual case study areas show a reduction in collisions / casualties when background trends are accounted for, these results are based on very small sample sizes and it is not possible to attach any confidence to their significance.

There is some evidence to suggest a positive 20mph impact in one case study location (Brighton Phase 1), where a blanket 20mph limit was introduced covering both major and minor roads, and where there is sufficient data to indicate a statistically significant change in collisions and casualties. It should be stressed that this represents just one case study, and the extent to which the findings are transferable to other locations is unclear.

The road safety data analysed for this study was based on between 17 and 42 months of data after the introduction of the 20mph limits, reflecting the different implementation dates for the various case study schemes. Further data is required to determine the long-term impact of the limits. Collision and casualty rates are known to fluctuate from year to year, and the post implementation data currently available may not be indicative of the longer-term trend.

Walking and cycling – Feedback from local residents and road users suggest that slower speeds are one of a combination of factors required to improve the environment for walking and cycling. In the case study areas, there continues to be a range of barriers which discourage walking and cycling. Time constraints, journey distance, and a general preference for driving remain important considerations. However, there are encouraging signs of a small (but significant) increase in use of active travel modes, based on self-reported evidence. In the case study areas, 5% of residents surveyed said that they are walking more and 2% said that they are cycling more since the introduction of the 20mph limits. Further changes may occur over time, as a result of the cumulative effect of other sustainable travel interventions or changes in individual circumstances.

Integration with other policy areas – This study has primarily focused on the impacts associated with introduction of a 20mph limit through signage and engagement activities only; and in the absence of any physical calming measures or changes to the landscaping or design of streets. It has not been possible, within the timescales of the study, to consider the longer-term role of 20mph limits as part of an integrated approach to address transport, community, environment and health objectives. In this context, the success of the Healthy Streets[52] approach in London, which has been integrated into all aspects of Mayoral policy, will be of particular interest. This seeks to make London a greener, healthier and more attractive place through policy making and delivery at a street-level, network-level, and development-level. Slower speeds

[51] Taylor et al. (2000), Finch et al. (2004), Elvik (2009), Richards (2010), Kröyer et al. (2014).

[52] Healthy Streets for London: Prioritising walking, cycling and public transport to create a healthy city (TfL, Feb 2017)

are at the heart of the approach, creating streets which are more attractive for people to walk, cycle and spend time in.

12.4. Impact of new vehicle technologies

It is important to note that the impact of new vehicle technologies has not been considered in this evaluation study. The introduction of the following technologies could have a substantial impact on vehicle speeds (and compliance with speed limits), vehicle emissions and noise:

- Driver assistance or override systems (and autonomous vehicles in the longer term) are likely to lead to much stronger compliance with speed limits.
- Comprehensive Vehicle Tracking (linked to insurance premium) is also likely to encourage stronger compliance with speed limits.
- Further improvements in combustion engine technology and vehicle efficiency (vehicle weight, tyres, etc) and increased proportion of hybrid and electric vehicles in the fleet, leading to reduced vehicle emissions per mile and traffic noise. In July 2017, the Government announced plans to end the sale of all new conventional petrol and diesel cars and vans by 2040, as part of The UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations, produced by DEFRA and the Department for Transport[53].

12.5. Lessons and considerations for national decision-makers

National guidance – Based on the findings of this study, the guidance set out in DfT Circular 01/2013 remains broadly valid. This states that where there is expected to be a positive effect on road safety and a general favourable reception from local residents, traffic authorities should consider implementing area-wide 20mph limits on:

- major streets where there are, or could be significant numbers of journeys on foot, and/or where cycle movements are an important consideration, and this outweighs the disadvantage of longer journey times for motorised traffic; and
- residential streets where the streets are being used by people on foot and on bicycles, there is community support, and the characteristics of the street are suitable;

and, on the assumption that the limits are generally self-enforcing and that there should be no expectation on the police to provide additional enforcement beyond their routine activity, unless this has been explicitly agreed.

However, consideration should be given to encouraging traffic authorities to work with relevant partners from the police, health, environment, urban planning, education, and the local community to deliver 20mph limits as part of an integrated approach to addressing transport, community, environment and health objectives.

The guidance also needs to recognise the concern amongst the public regarding the apparent lack of enforcement, and the general view that the likelihood of being caught exceeding the limit is very small. Where a more proactive enforcement approach by the police is not practical, authorities should be encouraged to consider alternative approaches (e.g. community-based initiatives, use of vehicle activated signs, etc.), which may still require low level involvement of the police.

It is acknowledged that the current guidance is likely to lead to a mix of approaches across the country in terms of speed limits in built up areas, which creates a challenge in terms of embedding a culture of slower speeds in residential and pedestrian environments, and achieving driver compliance where 20mph limits are in place. There may therefore be broader reasons for strengthening the guidance whilst recognising that authorities retain the responsibility for setting speed limits on their roads.

National awareness campaigns – Changing how drivers think about driving in residential locations and areas of high pedestrian and cycle activity is crucial to the success of 20mph limits; and ensuring that compliance with the speed limit becomes the norm. Local authorities have a key role to play here and can engage directly with the local community. However, national publicity (for example, as part of DfT's *Think!*

[53] https://www.gov.uk/government/news/plan-for-roadside-no2-concentrations-published (Accessed 17/04/2018).

road safety speed campaign) could also help highlight the benefits of 20mph limits and reinforce messages about driving at an appropriate speed in residential areas.

Further analysis of safety outcomes – This study has found no significant safety outcome (in terms of collisions and casualties) in residential areas, based on the post implementation data available to date. Due to the small sample sizes and variability in the data, the statistical analysis undertaken to date indicates that the real change could be positive or negative. In addition, it has not been possible to draw any conclusions regarding the relative change in fatal injuries, cycle casualties, and casualties involving older people.

In the case of both the residential and city centre case studies, further data is required to determine the long-term impact of 20mph limits. Collision and casualty rates are known to fluctuate from year to year, and the post implementation data currently available may not be indicative of the longer-term trend.

It is therefore recommended that the safety analysis is updated once five years of data becomes available for each of the case study areas, i.e. once the 2020 STATS19 data has been published. This would be in line with standard evaluation good practice as undertaking a five year post-implementation evaluation is the standard approach for monitoring the impact of major transport schemes.

Further evidence on walking and cycling – This study has found a small (but significant) increase in walking and cycling activity. However, the results are based on self-reported perceptions of behaviour change and may not accurately reflect the real change in the frequency and amount of walking / cycling activity undertaken. In addition, there appears to be a lack of robust evidence from other studies to demonstrate the impact of 20mph limits on walking and cycling levels. Given the central role of walking and cycling in delivering health and environmental benefits, further evidence is needed regarding the strength of the relationship.

This will be a challenge as change in mode use is influenced by a range of factors and may occur over time rather than as a one-off decision. Long-term analysis of the relationship between walking and cycling activity nationally and the roll out of 20mph limits, may identify a relationship, but would need to take account of external and extraneous factors.

Is 20 plenty for health? Evaluation of the 20mph speed limit networks in Edinburgh and Belfast on a range of public health outcomes.

The NHS National Institute of Health Research has commissioned a major study into the health impacts of 20mph limits based on schemes in Edinburgh and Belfast. The study will run until 2020 and is intended to provide evidence on the impact of 20mph speed limits on safety and levels of physical activity, using surveys and before and after counts. The study is being undertaken by the University of Edinburgh and Sustrans.

Clarity on the role of 20mph limits and air quality – The relationship between speed and air quality is complex and influenced by a mix of factors including vehicle type, brake and tyre wear, variability and consistency of driving speed, traffic volume, and the nature of the road environment. Given the current focus on air quality and the need for action in many local authority areas to meet the requirements of the National Air Quality Plan and EU Air Quality Directive requirements, further clarity on the role that 20mph limit schemes could play would be beneficial.

National database of speed limits – One of the key challenges for this study was the lack of a definitive national database of speed limits identifying the location of all 20mph limits. This would provide the Department for Transport with a greater understanding of the coverage of 20mph limits, and would enable more detailed investigation of national trends and datasets. For example, the rate of collisions and casualties on 20mph limit roads (compared with high limits) at a national level, links between levels of walking and cycling activity (as monitored in the Active People Survey) and the roll out of 20mph limits nationally, the role of 20mph limits in Air Quality Management Areas, etc.

Speedmap

Speedmap is a long-term project with the aim of producing a network-independent national speed limit map for the UK. It has been developed in recognition of the need for an accurate map to support innovation in road safety – without being tied to a costly proprietary mapping solution.

12.6. Lessons and considerations for local decision-makers

Lessons and considerations for local decision-makers are set out in Section 2.6, covering the following themes:

- clarity around strategic case, objectives and outcomes;
- integration with complementary transport, health, environment and community policies and interventions;
- tailoring the scheme design to local circumstances;
- signage requirements;
- the importance of effective consultation and engagement;
- engagement with young drivers;
- appropriate skillsets;
- management of public expectations;
- revenue cost; and
- monitoring.