

Road Traffic Collision Analysis

COVID Lockdown and long term casualty and traffic trends

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1. Aim

This document summarises work undertaken examining traffic and casualty trends during the main COVID lockdown period of April-May 2020, and makes comparison to normal patterns seen during 2019 and longer term trends in traffic and casualty numbers. It uses STATS19 casualty data, official traffic count records (TRA dataset), and up-to-date traffic counts from a sample of ATC¹ sites representing a range of road types in Essex.

This document builds upon previous work that examined the initial impact of the COVID restrictions on traffic levels, vehicle speeds and road traffic casualties. It also includes analysis of the demographic profile of speeding drivers.

2. Executive Summary

- Traffic and collisions trends in lockdown have seen two distinct phases:
 - For the week 13-19² phase: Flow 54% below normal, 62% reduction in collisions, 54% reduction in KSI.
 - For the week 20-24 phase: Flow 26% below normal, 31% reduction in collisions, 28% reduction in KSI.
 - Overall weeks 13-24: Flow 43% below normal, 49% reduction in collisions, 43% reduction in KSI.

- As traffic flow reduced due to lockdown, the proportion of traffic speeding by both moderate and 'extreme' (15mph+) amounts increased. Total collision numbers fell in line with traffic volumes.

- The severity of collisions increased during lockdown, reasons for this are likely to include:
 - A greater proportion of those injured were cyclists.
 - Higher vehicle speeds resulting in more severe injuries for all casualty types. This is consistent with previous work that showed speed-related factors were recorded for a larger proportion of collisions since lockdown began.

- The 'congestion hypothesis' suggests there may be some threshold where increases in traffic volumes stop putting upward pressure on collision numbers, and start to cause a reduction as average vehicle speeds drop to levels that pose very little risk. Trends over the last 25 years do not indicate that this has happened, however since 2014 there has been a positive correlation between increased congestion and rate of collision reduction. Therefore, if we see a reduction in congestion resulting from the COVID measures, we may see casualty numbers cease their reduction or even start to increase.

- There has been no appreciable change in the age profile of speeders since lockdown began. The age profile of moderate (6-14mph over the limit) speeders is *younger* than that of extreme speeders (15mph+ over the limit). This may be for reasons including:
 - Tendency to extreme speed may be more related to individual personality than age.
 - Extreme speed may be a bad habit that takes time to develop.
 - Higher performance cars that increase the opportunity to extreme speed may become more affordable to people as they get older.
 - Harsher penalties for younger drivers may make them more selective about where they engage in high speed driving.

¹ Automatic Traffic Counter. These devices can measure vehicles speeds as well as traffic volumes.

² week 13 of 2020, commenced Monday 23rd March.

- The reduction in total number of speeding offenders has been greatest among those who live in areas of lower deprivation. This suggests that people living in these more affluent areas are better able to work from home and avoid the need to go out.
- There was a period during April where enforcement focussed primarily on extreme speeders. Data from 2019 indicates extreme speeders are less likely than moderate speeders to live in Essex. Consequently, there has been a shift in offender home location towards areas outside of Essex. In other words, focussing on extreme speeders has the side-effect of reducing the proportion of offences recorded for drivers who live locally.

3. Key Inferences & Recommendations

a. Key inferences

The COVID-19 restrictions have had a mixed effect of road safety. Large reductions in traffic volumes have reduced the number of casualties of all severities, but lower traffic volumes have also allowed vehicle speeds to increase. Higher speeds have meant that when collisions do occur, injuries tend to be more severe than they were before lockdown.

The easing of restrictions resulted in more traffic and more casualties, traffic speeds reduced but are still above those seen before lock-down. There is a concern that a small reduction in traffic below pre-lockdown levels could allow more risk from dangerous speed, without being a large enough drop in traffic to suppress overall collision numbers.

The profile of people caught speeding hasn't changed by very much, and any changes may be an artefact of who is most able (or indeed willing) to travel less during the COVID restrictions, and changes in enforcement strategy.

b. Recommendations

- 1) Maintain a well-publicised speed enforcement campaign.
- 2) Promote and support measures to create safe spaces for cycling. These should be data-led focussing in areas where cyclist casualties occur.
- 3) Publicity around the need to reduce demand on the NHS.

4. Summary of previous work

The paragraphs below summarise work carried out examining data up to 19th April, from a document completed on 4th May.

- 1) ATC data shows a clear trend of decreasing speed compliance rates with decreasing flow. This fits the hypothesis that there is a relationship between reduced congestion and reductions in speed compliance.
- 2) Not only has the rate of speeding increased, but also the total number of vehicles breaking the speed limit. The number of vehicles breaking the limit by at least 15mph has increased by 90% (i.e. nearly doubled). This may have come about from a combination of changes in driver perception, both around the risk of facing enforcement consequences, and the risk of involvement in a collision.
- 3) Since the COVID measures came into place there have been a number of changes in the collision profile in Essex, including:
 - a. A 77% reduction in the number of collisions, but only a 67% drop in KSI. There has been an increase in the proportion of collisions that result in the highest level of injury severity.
 - b. There have been reductions in all casualty types, but proportionally an increase in cyclist and P2W casualties. These casualties are associated with a higher likelihood of serious injury, so it is likely this is part of the reason for the increase in average severity identified previously. However this has occurred at a time of year when we would normally expect an increase in travel by two-wheeled modes with a corresponding increase in these casualty types. Given cycling is one of the few activities away from the home specifically sanctioned by the government, we would expect an increase in the number of people cycling, and this is supported by anecdotal observations.
 - c. The *number* of collisions involving inappropriate speed and drink/drug impairment has reduced, but the *proportion* of the total that involve these factors has increased. This indicates that the increased speeds identified in the ATC data *have* translated into collisions that could have been avoided if pre-COVID vehicle speeds had been maintained. It is also consistent with the view that people who drive impaired are less likely to heed the messages to stay at home.
 - d. There has been a small temporal shift in collision times towards the middle of the day, away from peak commuting times, and also a slight shift towards the weekend.
 - e. Reductions in collisions have been smallest on roads with 30-40mph limits.

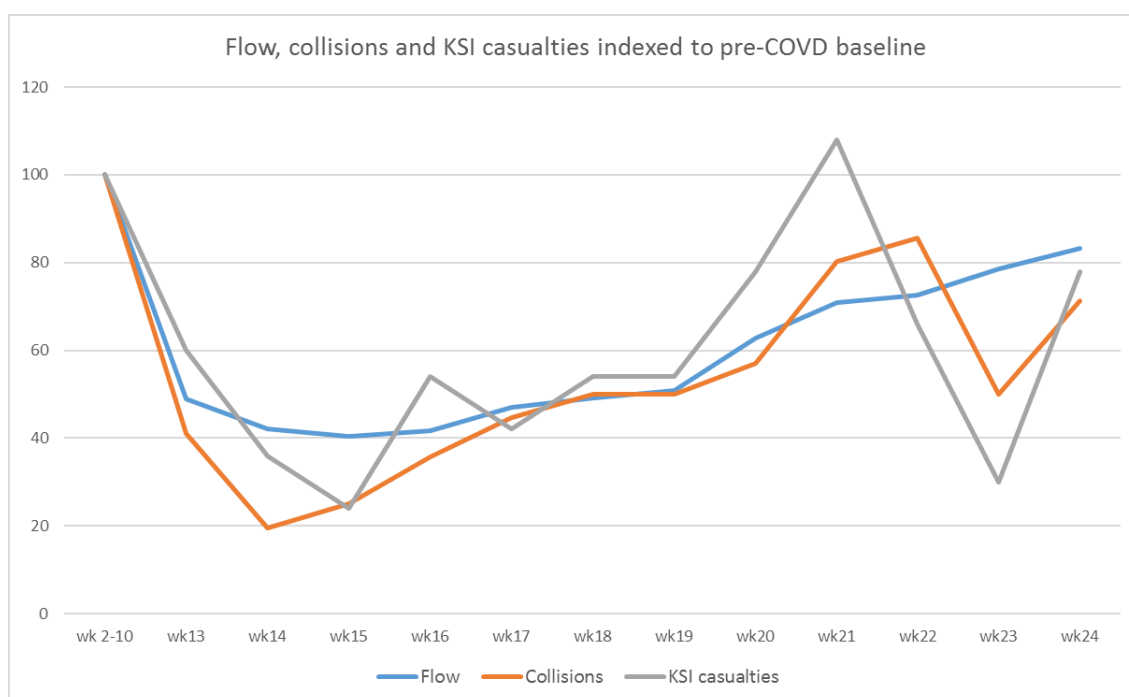
5. Flow, compliance and casualties

This section provides an update and further analysis to the findings from previous work summarised in section 4.

a. Traffic volume and casualties

The graph below illustrates the proportional change in traffic volume, number of collisions and number of KSI casualties since lockdown began³. The two week transition period where home-working increased and some events and businesses stopped operating has been excluded in order to make a clear distinction between lockdown and the pre-lockdown normality.

The graph uses an indexed value, where the pre-lockdown average equals 100, and subsequent values are shown as a proportion of this average.



This shows two distinct phases of lockdown:

- Weeks 13-19: Flow is more than 50% below normal.
- Weeks 20-24: Flow increasing steadily towards 80% of normal.

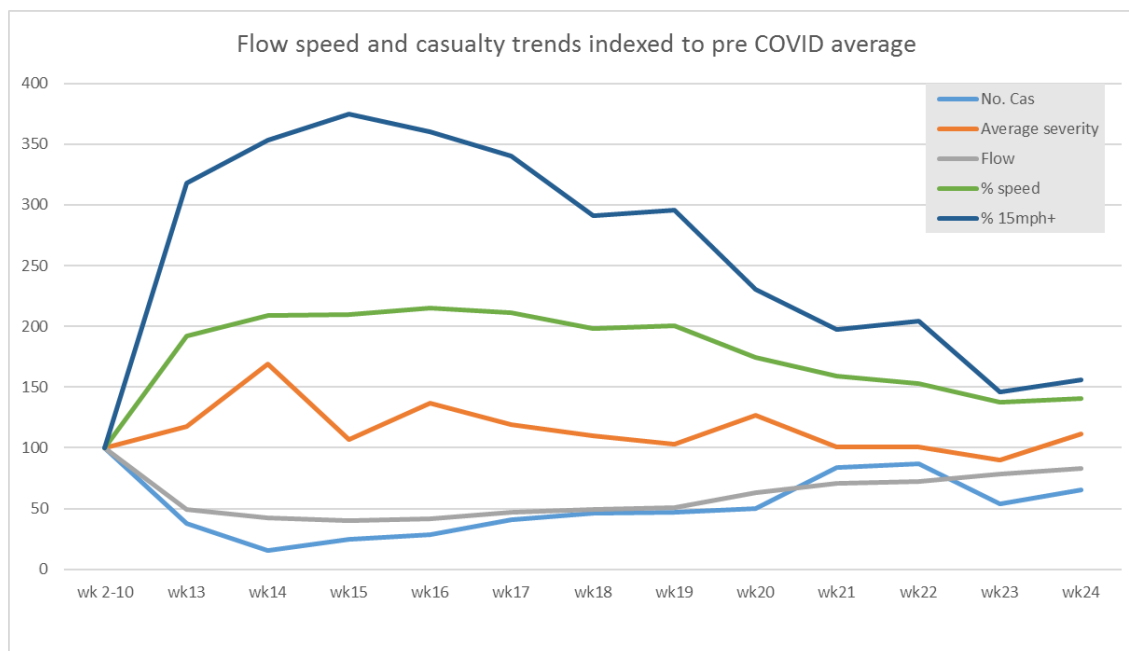
Collisions (all severities) and KSI casualties tend to correlate fairly closely with flow during this period. There is a bit more weekly variation with the KSI measure, but as this only relates to an average of 12 per week is more prone to random variation than the all-collisions measure.

- For the week 13-19 phase: Flow 54% below normal, 62% reduction in collisions, 54% reduction in KSI.
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³ week 13 of 2020, commencing Monday 23rd March

b. Severity and compliance

The graph below uses an indexed measure as before, in order to compare variables with a number of different scales. It uses a measure of 'average severity' that simply scores a fatal as 6, a slight as 1 and the four levels of serious as 2-5. This measures the severity distribution of casualties in any given week, giving a higher score if a greater proportion of them are more serious or fatal.



From this chart we can make a number of observations, including:

- The number of people driving 15mph+ over the limit increased almost exactly in line with reduced flow. In fact there is a very close inverse correlation between both flow and percent speeding by 15mph+ (-0.98) and percent speeding by any amount (-0.99).
- There was a fairly close positive correlation between flow and number of casualties (0.88). This means there is a close relationship⁴ between the number of vehicles on the road and the number of people injured in collisions.
- Average severity increased while flow was down and speeds were up, but the correlation coefficient was moderate (0.55 for speeding and 0.58 for speeding by 15mph+). During this period we are aware that there is likely to have been a large increase in the proportion of traffic that was vulnerable, particularly pedal cycles.

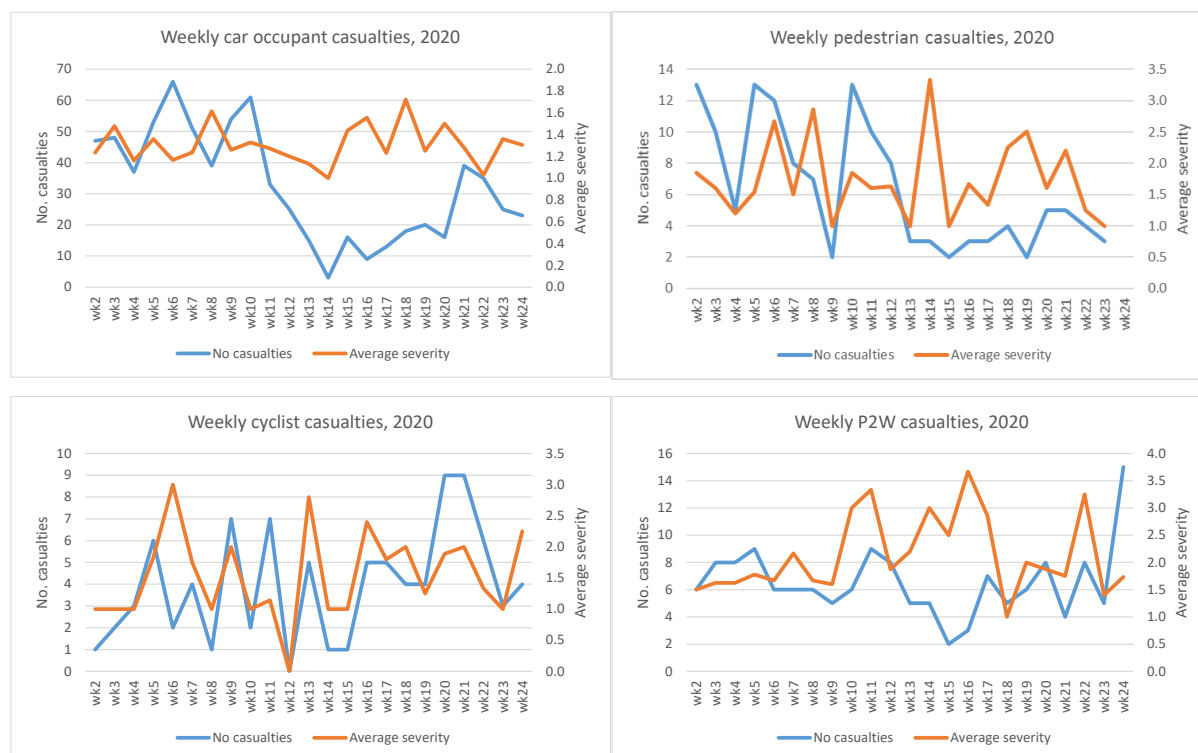
Average severity score pre-lockdown was 1.43, and during phase 1 it was 1.69 and was 1.50 during phase 2.

⁴ The numbers are related, this does not prove a cause and effect, however the mechanism for less traffic = fewer crashes is certainly very plausible.

ROAD TRAFFIC COLLISION ANALYSIS

c. Casualty mode

The following charts show trends in number and severity of the four main casualty transport modes; car, car, cycle, P2W and pedestrian.



These charts help visualise the changes in casualty numbers and severities so far during 2020. The table below shows this same data as above but summarised to make comparison between average weekly figures for pre lockdown (weeks 2-10) and the initial lockdown phase (weeks 13-19).

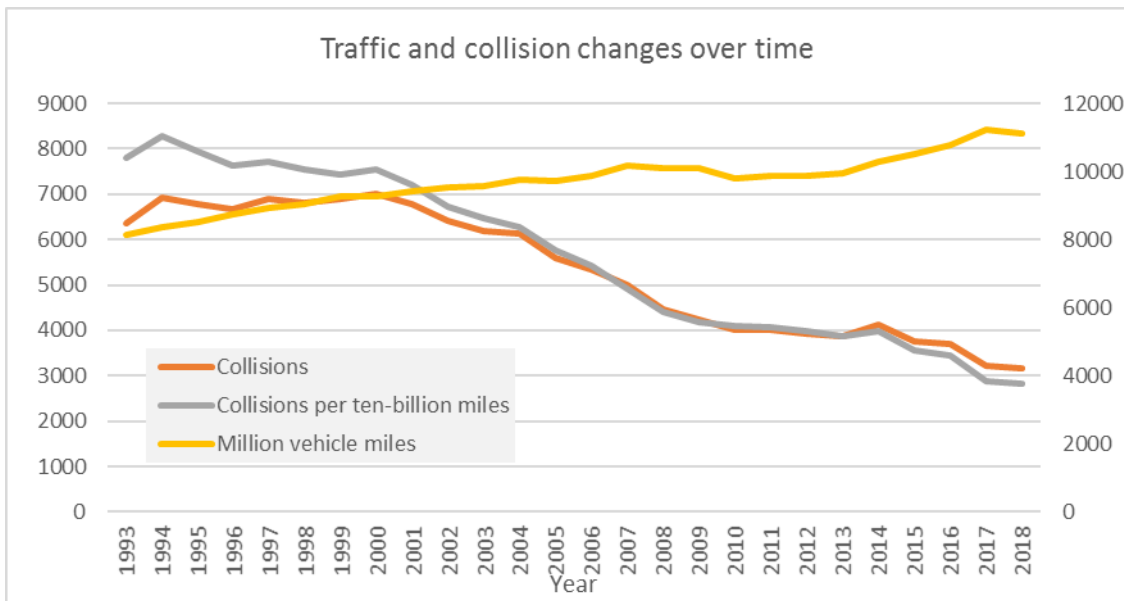
<i>Change in casualty numbers and severity between baseline (wk 2-10) and lockdown phase 1 (wk 13-19)</i>		
Casualty mode	Change in weekly number of casualties	Change in average severity score
Car occupants	-37.2	0.017
Pedestrians	-6.4	0.085
Cyclists	0.5	0.241
P2Ws	-2.0	0.613

This summary indicates reasons for the increase in overall injury severity are as follows:

- **More cyclists being injured.** Given that 37% of cyclist injuries are classed as KSI, compared to 14% of car occupant injuries, and that during lockdown the cyclist share of casualties increased from 4% to 14%, this would certainly account for some of the increase in overall average injury severity.
- **Higher vehicle speeds.** All road users saw a small increase in severity and there was a moderate correlation between measures of speeding and injury severity. Given the time period is insufficient to allow fundamental changes in the vulnerability of each group, and road traffic injuries are essentially a consequence of the absorption of kinetic energy by the human body, it is likely that this increase in severity for each group is at least in part a result of the higher vehicle speeds measured during lockdown.

6. Long term trends

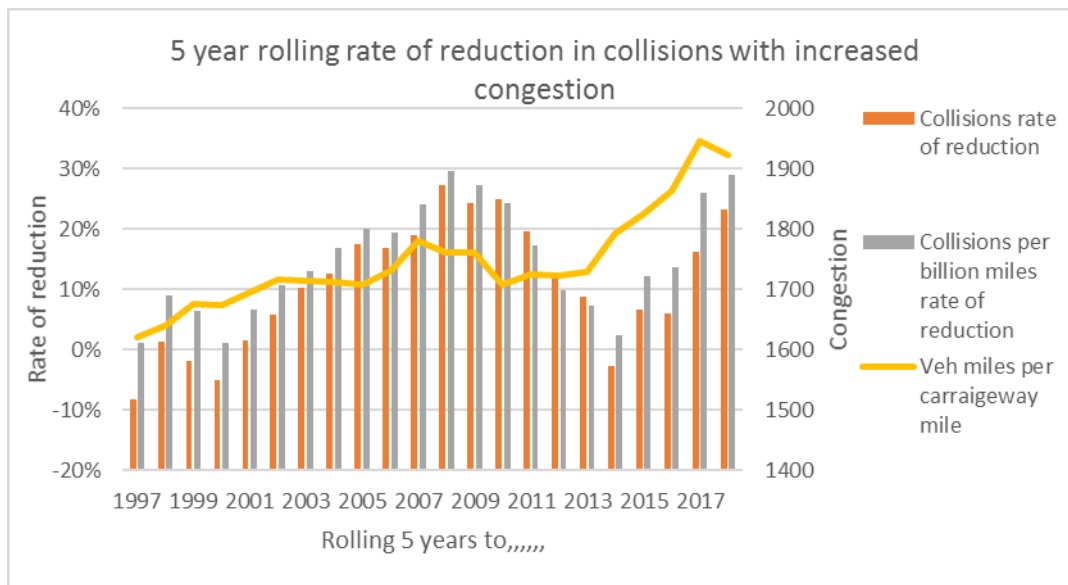
The previous section shows there is clearly a relationship between the number of vehicles on the road and the number of collisions. However, this relationship appears to be reversed for longer-term trends, in that while traffic has increased, the number of collisions has decreased, illustrated below.



There is an important difference between the long and short-term trends, in that road safety initiatives tend to be long-term investments with small incremental improvements in safety. Therefore an increase in traffic volumes over a long period of time may be mitigated by road safety measures, while changes in collision numbers during lockdown can be more directly attributed to traffic levels alone.

It has been suggested that increased traffic volumes could improve road safety as more congestion results in lower speeds. Although this relationship is likely to be complex, given factors such as vulnerability of two-wheeled vehicles filtering through traffic jams, and difficulty for pedestrians crossing safely in heavy traffic. This congestion hypothesis suggests there may be some threshold where increases in traffic stop putting upward pressure on collision numbers, and start to cause a reduction as vehicles spend increasing proportions of their journeys at speeds that pose very little risk.

The graph below uses the same data as the previous graph, but expresses collisions as a rolling 5 year rate of reduction, and traffic as a proxy measure for congestion (vehicle miles driven per mile of carriageway).



This shows three distinct phases since 1997:

- Phase 1, 1997-2005: Steadily increasing traffic and congestion, very small rate of collision reduction, but collision rate per vehicle mile is reducing when accounting for more traffic.
- Phase 2, 2006-2013: Little change in traffic and congestion but collision numbers continue to drop and at a faster rate than before. This may be the result of earlier or ongoing road safety initiatives having a chance to take effect without being counteracted by increases in traffic.
- Phase 3, 2014-2018: Much faster increase in congestion and traffic, initially halting reductions in collisions but recently coinciding with higher rates of collision reduction.

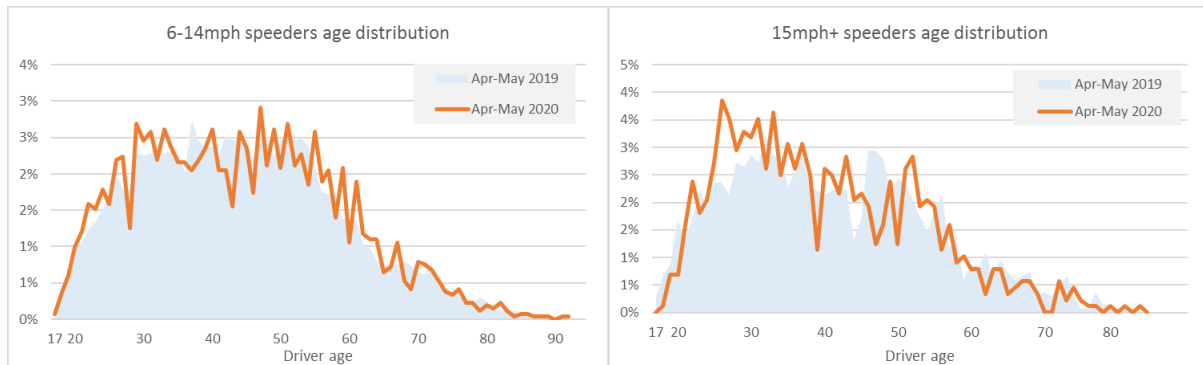
Without a detailed study of all the road safety initiatives of the last 25 years, as well as external factors affecting collisions, it is practically impossible to interpret these trends with any certainty.

However, phase 3 above does show a positive correlation between the congestion measure and rate of collision reduction. Therefore, if we see a reduction in congestion resulting from the COVID measures, we may see a return to the neutral rate of reduction from the start of phase 3, or even an increase in total collisions.

7. Offender profile

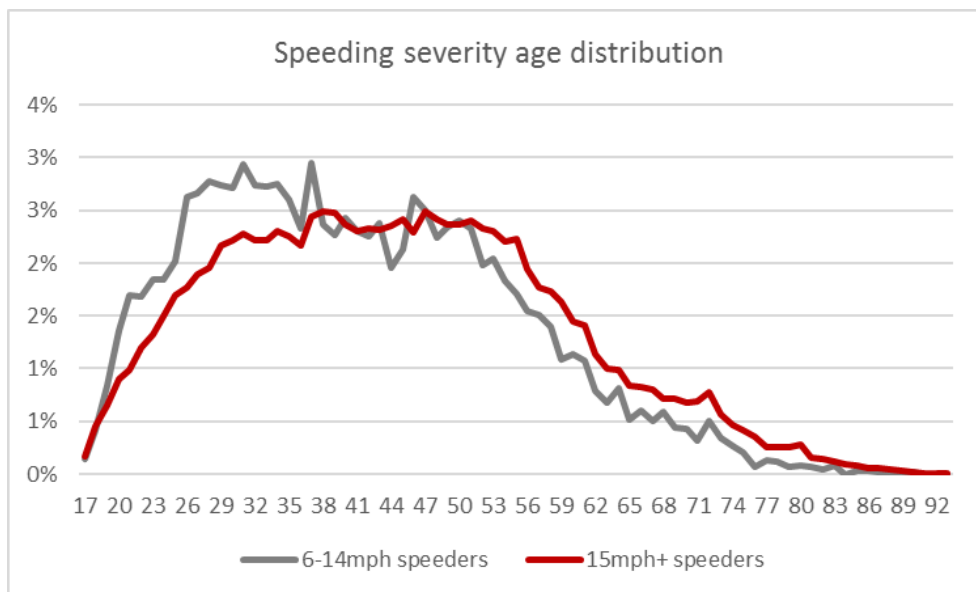
There was a brief hiatus in speed enforcement during the start of the lockdown period, with a further period where only extreme speed offences were being processed. This section compares demographic profiles for people caught speeding during April and May 2020 with the same period in 2019. It also compares profiles of 'moderate' speeders, with more 'extreme' speeders, i.e. those who were travelling 15mph or more above the limit.

a. Age



The graphs above show that for moderate speeders there has been little change in the age profile compared to 2019. The age profile for extreme speeders has become very slightly younger, but the average age has only reduced from 44.3 years to 44.2 years.

The next graph compares all moderate and extreme speeders caught since January 2019.

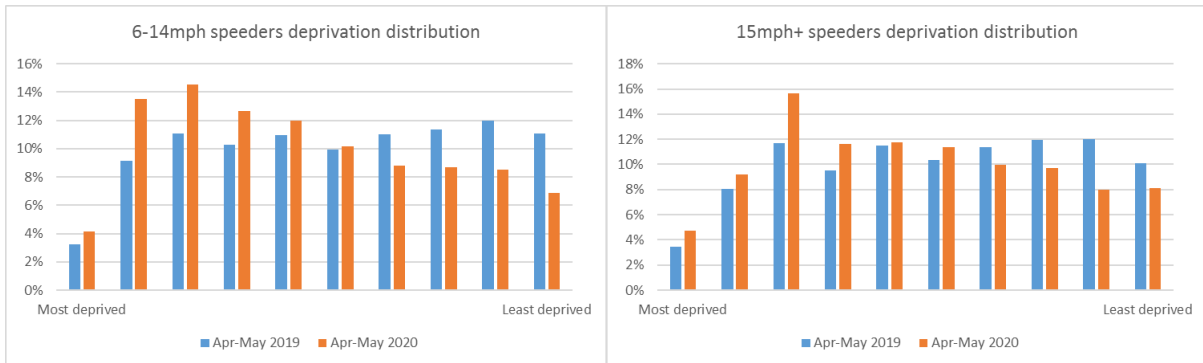


This shows a definite trend in extreme speeders having a slightly older age profile than moderate speeders, an observation that may be surprising given the wealth of research linking risk taking with youth. However that may be some reasons for this apparent discrepancy:

- Tendency to extreme speed may be more related to individual personality than age.
- Extreme speed may be a bad habit that takes time to develop after people pass their test.
- Higher performance cars that increase the opportunity to extreme speed may become more affordable to people as they get older.
- Harsher penalties for younger drivers may make them more selective about where they engage in high speed driving.

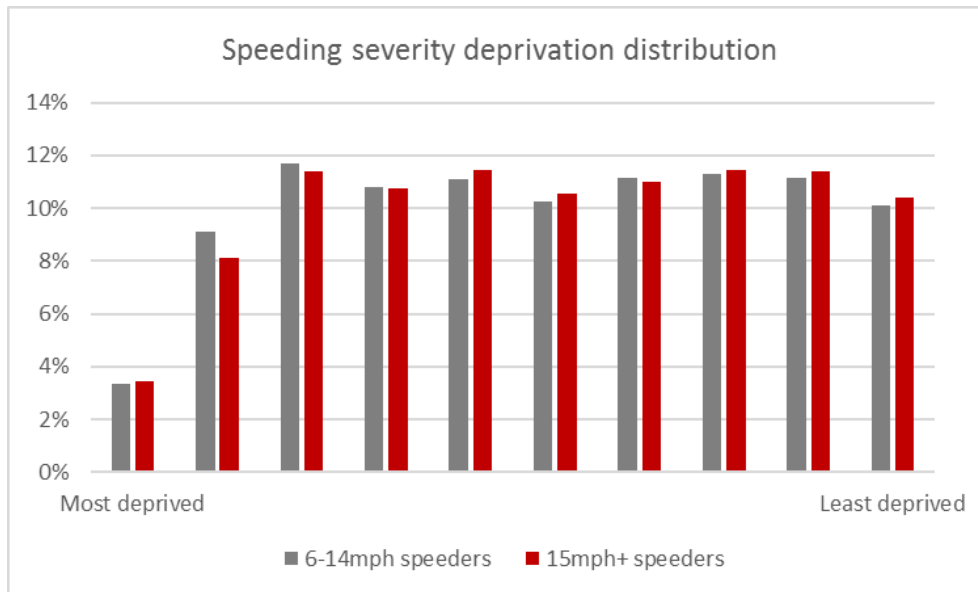
b. Deprivation

The charts display deprivation decile for offenders based on their postcode. Each bar is one deprivation decile, where all LSOAs⁵ in the UK are sorted in order of deprivation and placed into 10 groups of equal size.



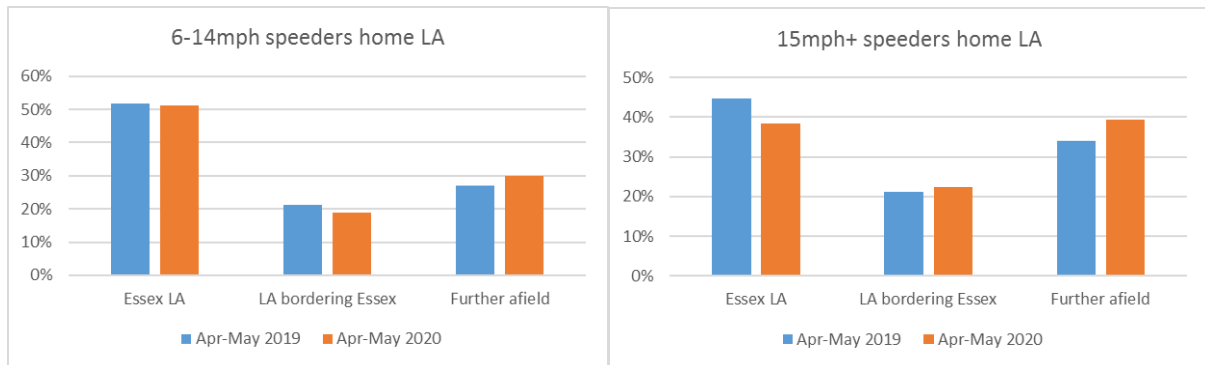
This shows a change in the deprivation profile for both moderate and extreme speeders, towards drivers being from more deprived areas during lockdown. It is important to note that this does not necessarily mean that more people from deprived areas are speeding - the total number of offenders reduced by between 36% and 70% in all deciles. This simply reflects a *greater reduction* in offenders from the areas of lower deprivation, possibly indicating people in more affluent areas are better able to work from home and avoid the need to go out.

Comparison between moderate and extreme speeders below shows very little difference in the overall deprivation distribution between the two groups.



⁵ Lower-level Super Output Area – a unit of geography.

c. Locality



The graphs above compare speeders by their home address local authority, grouped into Essex, bordering Essex, and further afield. This shows small changes in both groups towards a greater proportion of offenders being from further afield – this change is more pronounced among the extreme speeders but the effect is still small shifting from 34% in 2019 to 39% in 2020.

Why this should be the case is not immediately obvious, as we would expect traffic to comprise a greater proportion of local residents while travel is restricted to essential journeys only.

The next chart gives some indication that the shift may be because extreme speeders are more likely to live further afield than moderate speeders. As stated previously there was a period during April where enforcement focussed primarily on extreme speeders, therefore this shift in offender locality may simply reflect that change in enforcement practice rather than a change in offender demographics. In other words, focussing on extreme speeders has the side-effect of reducing the proportion of offences recorded for drivers who live locally.

