

HOW DOES DAYLIGHT SAVING TIME AFFECT THE SAFETY OF BRITAIN'S ROADS?

AN INTERIM EXAMINATION OF CRASH AND CASUALTY TRENDS AROUND CLOCK CHANGES

INTRODUCTION

Britain has followed the practice known as Daylight Saving Time (DST) since 1916. The official UK time is Greenwich Mean Time (GMT) during winter months, but is advanced by one hour to British Summer Time (BST) in the summer. The requisite clock changes have been applied on the last Sunday in March and the last Sunday in October since 1998, and with only minor variations in every year since 1972. DST is also in use in almost all European countries, and in many other parts of the world.

As a consequence of this practice, the times at which apparent sunrises and sunsets occur varies overnight by almost an hour after DST changes are applied. When "the clocks go forward" for the move to BST in March, mornings seem darker as sunrise apparently occurs an hour later, whereas evenings seem lighter as the apparent time of sunset changes. Conversely, when "the clocks go back" to GMT in October, the mornings seem lighter and the evenings darker.

There has been considerable discussion over many years and in many countries about the impact DST changes have on road risk, and how casualty reduction may be effected by altering the way in which DST is applied. This interim report sets out to inform the debate by examining the impact of DST changes on reported crash and casualty figures in Britain over the last six years. It forms the prelude to more detailed analysis which will be released at a later date. It focuses exclusively on hard evidence for consequences of the current DST regime, and does not address the issue of what effects any future changes may have.

METHODOLOGY

Using data supplied by the Department for Transport, several attributes were calculated for every injury crash on Britain's highways reported to the police in the six year period between 2004 and 2009. These included:

- Whether the crash occurred during GMT or BST
- Which DST change was the most proximate to the date of the crash
- How many days before or after the most proximate DST change the crash occurred
- The latitude and longitude of the crash location

The last attribute was analysed by superimposing on the map of Britain a grid of lines 100 km apart, then assigning each crash to a square in this grid based on its recorded location. This permits geographical analysis of crashes on a basis which is more relevant to the impact of DST than political boundaries. Due to the relatively low density of crashes, no separate analysis of crashes in the far north of Scotland was possible.

The analysis in this interim report is based on comparing periods of 14 days before and after both the March and October DST changes. Morning and evening crashes were analysed separately, on the basis of whether they occurred before and after midday. No distinction between crashes was made on the basis of casualty severity, although crashes which resulted in pedestrian casualties were analysed separately in order to identify any particular risk to which vulnerable road users are exposed.

The information used in this report includes crash date, time, OS Northing and Easting of location, light conditions and weather conditions; any crash record where any of these were missing or unknown is totally excluded. It is also important to note that no allowance can be made for possible distortion of results due to school term dates: it is often supposed that decreased traffic rates during school holidays result in fewer crashes, but as the timing of term dates relative to DST changes varies so much over time and in different parts of the country, no robust algorithm for incorporating this factor is available.

RESULTS

OVERALL TRENDS

National figures show an average increase of 355 crashes per year spread over both the fortnights following DST changes. This is equivalent to a 2.6% rise in the crash rate. This result does not correct for variation in traffic levels, which may be attributable to factors such as school holiday periods.

TRENDS AT THE MARCH DST CHANGE (CLOCKS 'GO FORWARD' TO BST)

There were **999 fewer** crashes before noon in the fortnight after the March DST change compared to the fortnight before, over a six year period; however, there were **1,417 more** after noon. This equates to an average **annual increase of 70 crashes, corresponding to an increase of 1.1% in the crash rate.**

TRENDS AT THE OCTOBER DST CHANGE (CLOCKS 'GO BACK' TO GMT)

There were **944 more** crashes before noon in the fortnight after the October DST change compared to the fortnight before, over a six year period; there were also **765 more** after noon. This equates to an average **annual increase of 285 crashes, corresponding to an increase of 3.9% in the crash rate.**

SUMMARY OF TRENDS

After DST change in	Time of day	Total net change	Annual crash trend	% variation
March	Before noon	-999	- 167	- 7.6%
March	After noon	+ 1,417	+ 236	+ 5.7%
October	Before noon	+ 944	+ 157	+ 6.4%
October	After noon	+ 765	+ 128	+ 2.7%
Overall		+ 2,127	+ 355	+ 2.6%

PEDESTRIANS

Analysis of crashes which result in pedestrian casualties shows an average increase of 72 crashes per year spread over both the fortnights following DST changes. This is equivalent to a 3.2% rise in the crash rate.

There is a noticeable decrease in crashes resulting in pedestrian casualties after the March change to BST, with an annual average of 44 fewer crashes each year. Unfortunately, this positive trend is more than counterbalanced by an average annual increase of 117 crashes each year following the October change to GMT.

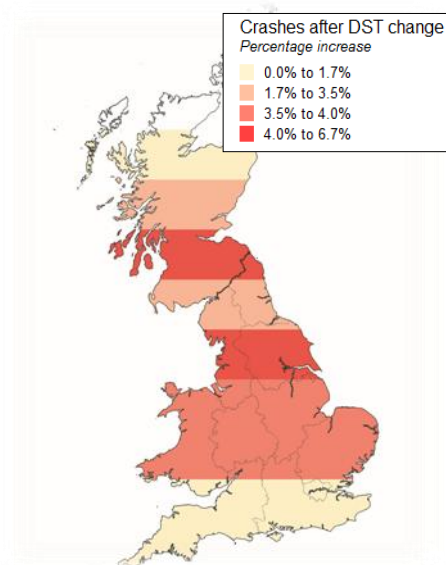
POOR WEATHER CONDITIONS

The analysis was repeated for crashes occurring in adverse weather conditions such as rain, snow, fog or high winds. Unsurprisingly the proportion of crashes which occurred in such conditions decreased after the March change to BST, but a small decrease in the proportion of crashes occurring in adverse conditions after the October change to GMT was also observed. It therefore appears unlikely that increases in the crash rate after the October change to GMT can be attributed primarily to worsening weather.

GEOGRAPHIC VARIATION

Examining the net result of both DST changes, no area of Britain appears to benefit significantly from the current arrangements. The analysis of crash locations by latitude shows only marginal annual benefits associated with the March change to BST. Northern Scotland does not experience any increase in crash rate after the October change to GMT although the number of crashes involved is relatively small (about 2% of the total).

Most of the rise in crash rates, accounting for over 80% of the net increase, occurs across the central area of the country with little significant variation. The latitude band showing the most substantial increase is also that closest to the middle of Britain. Interestingly, the most southerly parts of the British Isles do not show any significant net change.



ANNUAL AVERAGE CRASH RATES 2004 TO 2009 BY LATITUDE BAND

Description of approximate area covered	Net annual crash trend after March change	Net annual crash trend after October change	Net annual crash trend after both changes	% crash variation after both changes
<i>Caithness & Northern Isles</i>	-3	+1	-2	-
Grampian, Sutherland & W Isles	-3	+3	-	0.0%
Tayside, Fife & Trossachs	+3	-1	+2	+ 1.7%
Glasgow, Edinburgh & Borders	+9	+18	+27	+ 4.0%
N England & SW Scotland	-7	+22	+15	+ 2.2%
Lancashire, Yorkshire & Humberside	+59	+59	+118	+ 6.7%
N and E Midlands & N Wales	+45	+45	+90	+ 3.5%
W and S Midlands, E Anglia & S Wales	-7	+97	+90	+ 3.8%
London, S England, Kent & Severn	-29	+38	+9	+ 0.2%
SW England & Channel Coast	+3	+3	+6	+ 1.1%
TOTAL	+70	+285	+355	+ 2.6%

CONCLUSIONS

The evidence in this interim report suggests that the present DST arrangements do not provide any significant overall road safety benefit. If anything, the status quo may contribute to some increase in overall road risk. Any modest reductions in risk at certain times for particular areas or road user groups are more than outweighed by more substantial negative effects at other times.

It should be noted that there are a number of additional factors which require further exploration before this conclusion can be considered definitive, and this report does not address the effect of any possible future changes in DST arrangements.

NEXT STEPS

The final report will be published at a later date, and will include further analysis on the following areas:

- Geographical distribution of risk
- Daylight and Darkness crash frequency
- Age and background of casualties
- Modes of transport, including pedal cycles

ABOUT ROAD SAFETY ANALYSIS

Road Safety Analysis (RSA) is a not-for-profit company which provides data analysis solutions and advice to the road safety profession, across both the public and private sectors. It was established earlier this year to support MAST Online, a powerful yet user-friendly tool for analysing road casualty trends and examining the impact of residence, social and demographic factors on casualty rates.



In June, RSA helped the Department for Transport to release an open access website that allows members of the public to look at road casualty data and carry out their own analysis. In August, RSA published a report into resident road risk, focussing on risk to children on Britain's roads. RSA also works with the Highways Agency to promote intelligence-led road safety for the strategic road network.

For more information visit www.roadsafetyanalysis.org.uk or to access publicly available road casualty reports visit www.roadcasualtiesonline.org.uk.

ABOUT PACTS

The Parliamentary Advisory Council for Transport Safety (PACTS) is a registered charity and an associate Parliamentary Group. Its charitable objective is "To protect human life through the promotion of transport safety for the public benefit". Its aim is to advise and inform members of the House of Commons and of the House of Lords on air, rail and road safety issues.

For more information about PACTS and how to become a member, visit www.pacts.org.uk.



FURTHER INFORMATION

After the final report is released, the analytical tools used to generate these results will be made available to the road safety community as part of MAST Online. In the meantime, for further information about the contents of this interim report and the analysis behind it, please send an email to info@roadsafetyanalysis.org.