

Follow-up of Subsequent Crash and Offence Records of Offending Drivers who either did or did not attend an Intervention Program

Craig Kloeden¹ and Paul Hutchinson¹

¹ Centre for Automotive Safety Research, University of Adelaide, Adelaide, South Australia

1 Introduction

The Driver Intervention Program (DIP) is a 90-minute interactive, small-group workshop for disqualified L- or P-plate drivers, aged 25 and under, living in Adelaide and in some rural centres close to Adelaide. The program and some characteristics of drivers attending are examined by Wundersitz and Hutchinson (2006). Those eligible for DIP are not some limited number of “repeat” or “problem” or “recidivist” drivers. One offence of speeding is sufficient for licence disqualification.

We will compare the subsequent crash and driving offence experience of two groups of offending drivers: those attending DIP, and those who should have attended DIP but chose not to and pay an expiation fee instead. Section 2 will describe how the DIP is administered. Section 3 compares the sex-age profile of what we will call the DIP and Expiation groups of drivers. Section 4 describes the method of data analysis. Sections 5 and 6 report the main results, comparing these groups in respect of crashes and driving offences. Section 7 examines the contrast that seems to exist in that a difference is found in respect of offences but not in respect of crashes. Section 8 is discussion. There is greater detail about the processing and analysis of the data in Kloeden and Hutchinson (2006).

An important point to bear in mind throughout is that no experiment was performed, randomly allocating offending drivers to DIP or Expiation groups --- the drivers themselves chose whether or not to attend the DIP. It is quite possible that the decision whether to attend or not is affected by factors (geographical, social, psychological, and so on) that also affect the likelihood of crashing or committing a driving offence. In terms of attempting to prove causation, the results will thus necessarily be inconclusive: if a difference between DIP and Expiation groups were to be found, it could be said that the cause was not attendance at DIP but instead was to be found among the pre-existing differences between the groups. (See Hutchinson and Meier, 2004, for discussion of the place of randomised experimentation in road safety research.) Nevertheless, there is considerable interest in following up the subsequent crashes and offences of drivers who have qualified for DIP (i.e., have offended).

Our perception is that there is a widespread view that any form of advertising, education, or training will not greatly improve driver behaviour. According to Ker et al. (2003), “The review of trials found strong evidence that no type of driver education for licensed drivers leads to a reduction in traffic crashes or injuries”. Masten and Peck (2004) reviewed 35 studies that they considered to be methodologically sound. These included many different types of intervention, including licence suspension and the distribution of educational or informational material.

- Averaged over the various interventions, there was a 6 per cent decrease in crash rates for treated drivers.
- Some interventions were more effective than others. For licence suspension, there was a 17 per cent decrease in crash rates. (At least part of the effect is likely to be due to reduction in distance driven.) For provision of educational or information material, there was a 1 per cent increase.

It might be reasonable to describe the interventions as varying in intrusiveness, and to conclude that the more intrusive ones (such as licence suspension) were the most effective, those of intermediate intrusiveness (such as group or individual meeting) were of lower effectiveness, and those of least intrusiveness (such as educational or informational material) were least effective. It seems likely that the interventions described as group or individual meetings were more intrusive than the South Australian DIP is. The (U.S.) National Safety Council's defensive driving course is eight hours, for example. That being so, it might reasonably be suggested on the evidence of this review that the likely impact of the DIP in Adelaide is between the 5 per cent improvement that Masten and Peck report for group meetings and the 1 per cent worsening that they report for educational or informational material. Around 2 per cent as a rough figure, not around 20 per cent or 50 per cent, is to be expected. Senserrick and Haworth (2005, Section 2.4) express the opinion that "One day or half-day programs... are unlikely to be associated with crash reductions". Thus effects of interventions tend to be small. Does this mean they are small as to be not worthwhile? No, according to Masten and Peck. They say (p. 415) that extensive investigations over the past 30 years by the California Department of Motor Vehicles have shown that that state's measures are justified by benefits outweighing costs (Peck was formerly chief of the Research and Development Branch of the California Department of Motor Vehicles).

Would evidence about offences against traffic laws be a convincing substitute for evidence about crashes? At present, such evidence would probably not be convincing: there have been repeated suggestions in the literature that effects of interventions on offences tend to be greater than effects on crashes. The difference seemed to be small in the review of Masten and Peck, though the earlier review by Struckman-Johnson et al. (1989) emphasised it more. It would be of great interest if it could be established that effects on offences are reproduced in diluted form in the effects on crashes, or alternatively that effects on offences are due to factors that do not affect crashes. There will be some further discussion of this in Section 7 below.

2 The DIP administrative process

The process from when a driver commits an offence until he or she takes the DIP, or time runs out, will now be summarised. (See also Kloeden and Hutchinson, 2006, Section 2.) There are difficulties in data analysis because offending drivers who participated in the DIP did so at a particular time, but there is no analogous moment of time for those who paid the expiation fee instead. The moment chosen to anchor the data analysis is when a Notice to Attend was sent.

- The L-plate or P-plate driver commits any of several offences. (The majority of offences are speeding.)
- Some time later, Motor Registration issue disqualification to the driver. This can be appealed (and often is) but a successful appeal against this penalty does not remove the onus on the driver to participate in the DIP.
- The DIP coordinator sends a Notice to Attend if the offending driver is aged 16-25 and lives within 50 km of a DIP centre. The Notice instructs the offending driver to book in to DIP. If the offending driver does not do this, an expiation fee must be paid. (The fee was \$74, the fee for the DIP was \$32.) Reminder letters are sent if need be.

Thus there is a self-selected group of offending drivers who take DIP roughly six months after their offence, and another self-selected group who pay an expiation fee instead. There are a few offending drivers who fall outside this division, for one reason or another.

3 The driver sample

In order to obtain a sample of drivers for analysis, records of all drivers who were eligible for attendance at DIP and who were sent their first Notice to Attend in either 2001 or 2002 were extracted from the DIP database maintained by DTEI (Department for Transport, Energy and Infrastructure, South Australia). All these drivers had a choice of attending a DIP session or paying an expiation fee. Driving licence numbers were used to match the drivers to records in crash and offence databases. For crashes, this was the TARS (Traffic Accident Reporting System) database, based on police reports and maintained by DTEI. For offences, it was an extract from a database held by Motor Registration.

There were 5552 drivers in our sample, of whom 65 per cent were aged 17 or 18 (at the time the Notice to Attend was sent) and 84 per cent were male. The majority of drivers (70 per cent) attended DIP, and the others paid the expiation fee. In the case of drivers aged 20 and over, the majority paid the expiation fee. Females were slightly more likely to attend DIP than males. For the drivers that did attend DIP, the median time to complete their DIP session was about six months from when the Notice to Attend was sent.

4 Processing of data

The matched records permitted us to follow-up what happened to drivers eligible for DIP after they had received a Notice to Attend, and to determine whether they recorded any crashes or offences. Since the Expiation group did not attend a DIP session, the date of attendance cannot be used as a reference date for comparing crash experience. Instead, it was decided to use the date of sending the first Notice to Attend (referred to below as the letter) as a common reference date for both the DIP and Expiation groups.

Crash rates are known to vary greatly with the age and sex of drivers. As noted in section 3, age and sex appear to influence the decision to participate in DIP or pay the expiation fee. Adjustment should be made for this when comparing crash rates. To do this, the rates for individual sex-age groups in the Expiation group were applied to the corresponding sex-age groups in the DIP group. Also, a logistic regression was carried out to determine whether group (Expiation vs. DIP) is an explanatory variable beyond the age-sex combination. This permitted statistical significance tests to be performed. Probably the easiest form in which to appreciate the results is as a comparison between the DIP group and the Expiation group adjusted for the sex-age differences, and that is what will be presented below.

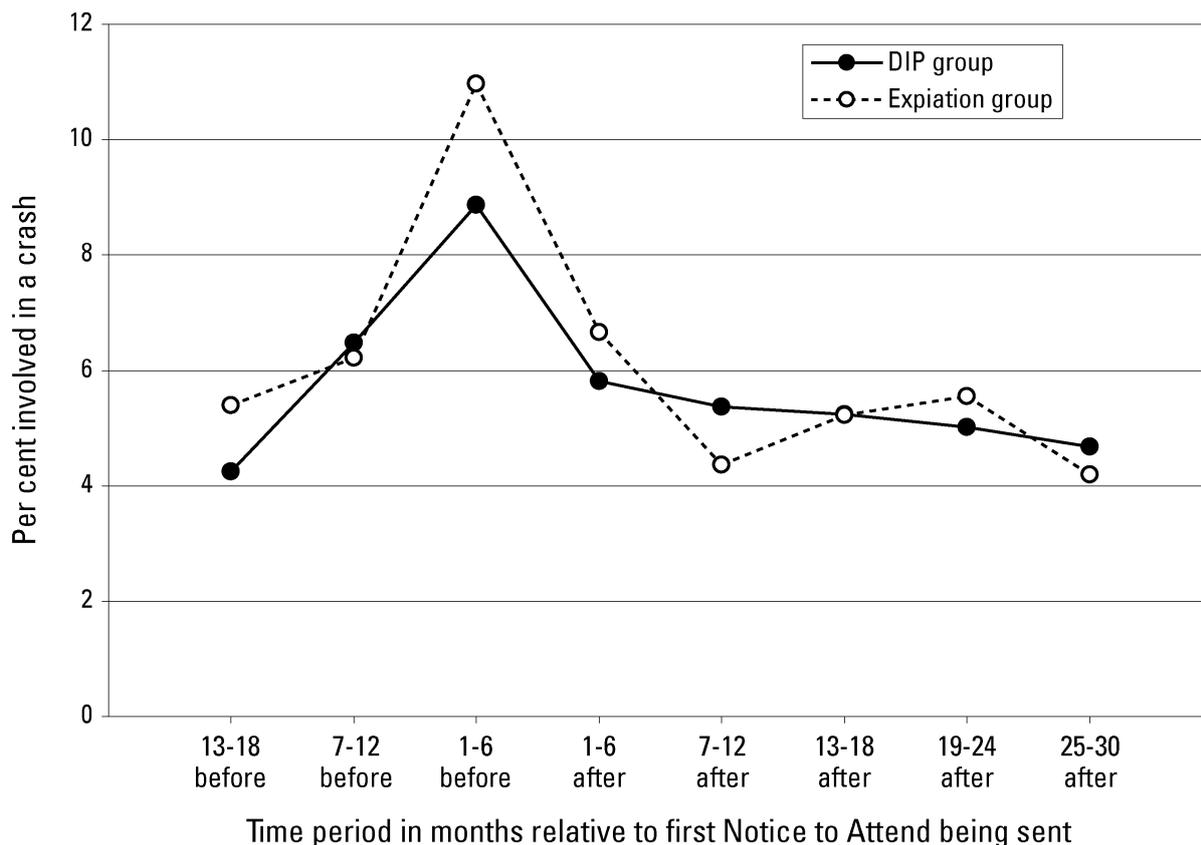


Figure 1. Crash involvement during various six month intervals relative to the first letter being sent: Comparison of DIP and Expiation groups, the latter being corrected for sex and age differences.

5 Results: Crash experience

There will be two major sets of results. The present section will compare the crash experience of the DIP group with the Expiation group of drivers, then Section 6 will compare the offences committed. As said earlier, the drivers themselves chose which group they were in. Thus whatever the results are, they could be related to pre-existing differences between the groups, i.e., not caused by attendance or non-attendance at DIP. This is not merely a theoretical possibility: we will demonstrate that differences between the groups existed before they became eligible for DIP.

5.1 Involvement in a crash

Figure 1 reports driver involvement in crashes that involved a casualty or total crash damage of \$3,000 or greater. The rates for the Expiation group have been adjusted for the age and sex difference of this group from the DIP group. The results of most interest are those after the first letter was sent, but those referring to periods before the letter throw light on whether there are pre-existing differences between the DIP and Expiation groups of drivers.

The main result is that for time periods after the first letter was sent, there is no statistically significant difference between the DIP and Expiation groups. Thus choosing to do DIP or paying the expiation fee does not have a strong association with future crash experience.

As to pre-existing differences between the groups, the difference for the *1-6 month before* period is statistically significant (but not those for the other *before* periods).

Other points of interest are as follows.

- Averaging over the five six-month periods after the letter, and over the DIP and Expiation (adjusted) groups, 5.2 per cent of drivers are involved in a crash per six months.
- Concerning the raw percentages for the Expiation group --- i.e., without adjusting for the age-sex difference from the DIP group --- these are, for the five six-month periods after the letter was sent, on average 0.4 lower than what is shown in Figure 1.
- Crash involvement in the *13-18 month before* period is presumably lower than it would otherwise be because a significant proportion of drivers had not obtained a licence at this point in time.
- The high level of crash involvement in the *1-6 month before* period is presumably because some of the offences that led to the driver entering the DIP system were discovered as a result of a crash.
- The rates in the *1-6 month after* period might be considered surprisingly high, considering that these drivers were all at some point disqualified from driving; our understanding is that many of them appeal successfully against disqualification.

5.2 Crashes of all L- and P-plate drivers

For comparison, the crash involvement rate for all L- and P-plate drivers (i.e., chiefly those who did not commit an offence) may be of interest. It is not straightforward to get an appropriate figure: for example, the results above refer to drivers living within 50 km of a DIP centre, but such a restriction cannot be imposed on the crash dataset as a whole. What we did was to select all drivers who were on an L or P plate on 1 January 2002 and determine their crash involvement rate by age and sex group for the following six month period. Crashes were restricted to those involving a casualty or total property damage of \$3,000 or greater, and ages were grouped as 16-17, 18, 19, 20+. These rates were then applied to the sex-age profile of the DIP group. The procedure was repeated for the reference date of 1 July 2002, to allow for seasonal effects on crash involvement rates, and the two resulting rates averaged. In this way, we found a comparison rate of 3.9 per cent. This crash rate involvement of L- and P-plate drivers as a whole is lower than that of both the DIP and Expiation groups shown in Figure 1. (This refers to rate per unit time, not necessarily to rate per kilometre driven.)

5.3 Other crash measures

We have also examined other measures of crash involvement, including being responsible for a crash, being involved in a casualty crash, and being responsible for a casualty crash. All these analyses produced similar results to those above.

5.4 Appropriate time period

It is not clear which time period is most appropriate for assessing DIP. Too short, and only a fraction of participants have taken DIP --- only about half completed DIP within six months of the letter. Too long, and any beneficial effect may have faded away. Perhaps one might expect the greatest effect in the third six-month period after the letter: at the start of this, everyone has taken DIP and noone took it more than a year previously. Regardless, if DIP were having a substantial effect, one would expect to see it somewhere in Figure 1.

Unfortunately, the clear message of Figure 1 is that any effect of DIP is too small to be detected with the data we have.

6 Results: Offence experience

In this Section, we compare the driving offence experience of the DIP and Expiation groups of drivers. The methods used were similar to those for crashes, and the reservations about conclusions that were noted there apply here also.

The data available to us allowed us to analyse offences committed from 12 months before to 18 months after the first letter was sent. We were also limited to drivers who obtained a P-plate from 1995 to 2003. This excluded analysis of some of the older drivers and of drivers who committed offences on an L-plate and did not go on to get a P-plate before the end of 2003. The effect of this was to reduce the sample from 5552 drivers to 5316 drivers (a 4.3 per cent reduction in numbers): 9.1 per cent of the Expiation group were lost and 2.2 per cent of the DIP group, leaving 1662 in the Expiation group and 3806 in the DIP group.

6.1 All offences

Results are given in Figure 2 concerning the percentage of drivers who committed at least one offence of any kind within various time periods. Percentages for the Expiation group are adjusted to the same sex and age composition as the DIP group.

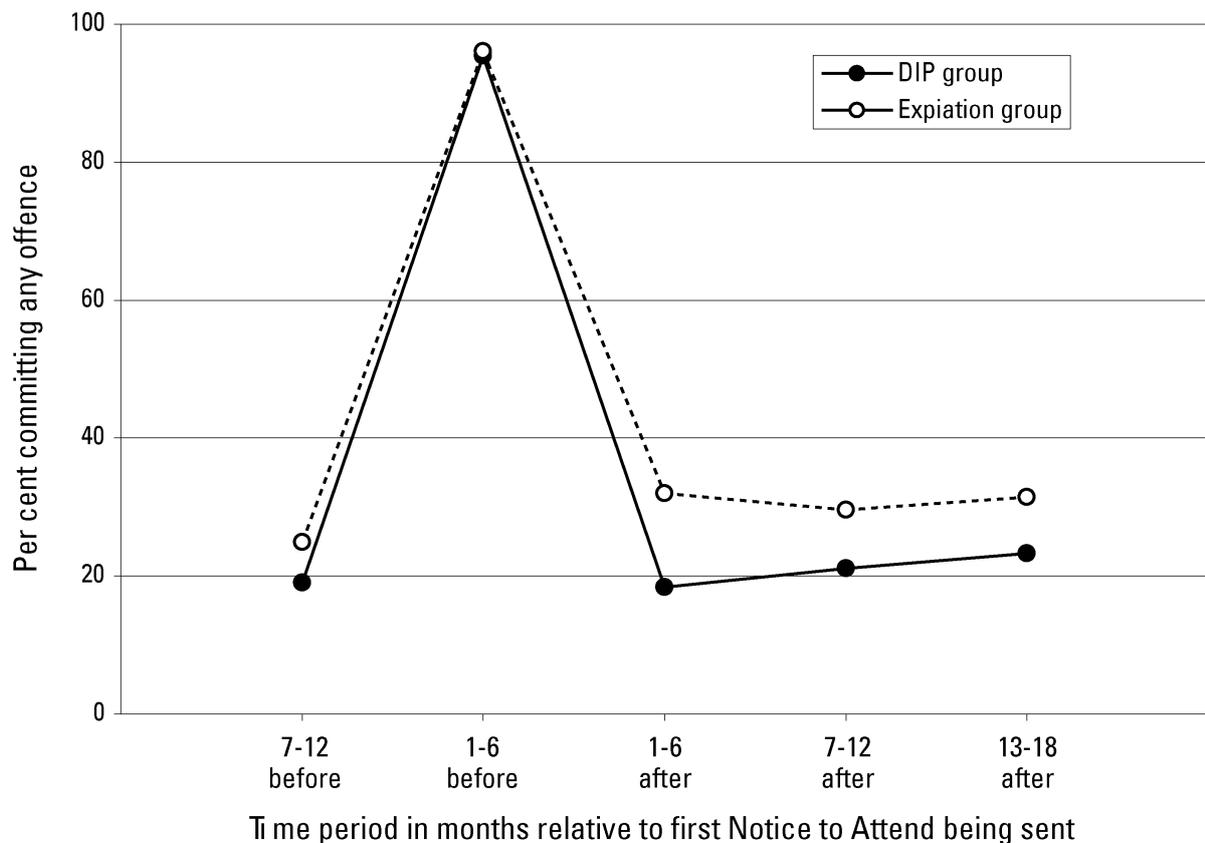


Figure 2. Offence rate during various six month intervals relative to the first letter being sent: Comparison of DIP and Expiation groups, the latter being corrected for sex and age differences. (Note that the scale vertically is very different from that in Figure 1.)

- The results of most interest are those after the first letter was sent. Committing an offence was appreciably more common in the Expiation group than in the DIP group, and this difference was statistically significant.
- As with the crash data, the rates in the *1-6 month after* period are not very low, and the explanation is the many successful appeals against disqualification from driving.
- Results for the *1-6 month before* period are not of much interest: committing an offence was the reason these drivers entered the DIP system, and it is not surprising that this nearly always happened in this time period.
- Concerning the *7-12 month before* period, committing an offence was more common in the Expiation group, to a statistically significant extent.

A baseline offence rate for all L- and P-plate drivers was obtained by a similar method to that described for crashes (Section 5.2). The result was 11.5 per cent, much below the rates for both the DIP and Expiation groups. (Note again that this refers to rate per unit time, not necessarily to rate per kilometre driven.)

6.2 Moving and administrative offences

Moving offences are those such as speeding, drink driving, performing an illegal manoeuvre, or disobeying signs or traffic signals. These presumably directly increase crash risk. Administrative offences are those such as not using a seatbelt, unlicensed driving, failing to carry a licence, or driving an unregistered vehicle. They have a less immediate connection with crash risk than do moving offences. They suggest an unwillingness or inability to correctly handle bureaucratic procedures, or even a disdain for authority.

The difference in respect of total offences in the three *after* periods that is seen in Figure 2 seems to occur for both moving and administrative offences, but to be more pronounced for the latter. In the five six-month periods from 12 months before to 18 months after the letter, the percentages of the groups committing at least one moving offence were as below.

DIP group: 15, 72, 14, 17, 19

Expiation group: 20, 68, 21, 19, 24

Thus for the three *after* periods, the figure for the expiation group is about 1.3 times that for the DIP group. A similar comparison for administrative offences is as below.

DIP group: 5, 38, 7, 7, 7

Expiation group: 10, 55, 18, 16, 14

Here, for the three *after* periods, the figure for the expiation group is about 2.3 times that for the DIP group. (In the above comparisons, figures for the Expiation group have been adjusted for the age-sex differences.)

Baseline offence rates for all L and P-plate drivers were calculated as 9.0 and 3.9 for moving and administrative offences. Clearly both the DIP and expiation groups had higher rates for both types of offences than L- and P-plate drivers as a whole.

7 The contrast between crashes and offences

A difference between DIP and Expiation groups appears for administrative offences that does not appear for crashes. The behaviour of the data on committing a moving offence is somewhere in between.

In Tasmania, Boyce et al. (1979) found that non-moving offences, but not moving offences, were more frequent in a sample of young people of low intelligence than in young people of higher intelligence. They suggested this might be a literacy or verbal intelligence problem.

The ratio of non-moving to moving offences was also relatively high in young people from “multi-problem families”. Boyce et al. suggested that the illiterate “should be given special licences with a requirement that they should receive aid and supervision by the police in dealing with statutory matters. Their resentment could thus be diminished and there would be a better relationship between them and the police, for this resentment spills over into other fields of anti-social behaviour”. The exact relationship of this to our results is not clear, but this study at least brings home the point that vehicle offences are not necessarily a reflection of likelihood of crashing. Earlier, Boyce and Dax (1975) had compared a high school having driver education in the curriculum with four high schools that did not. They found that at the former, there were reductions in both non-moving and moving offences, the reduction in non-moving offences being the greater.

A finding of an effect on offences but not on crashes is common in the literature. It occurs in studies using good methodology (i.e., randomised trials), as well as those using self-selected samples (such as the present paper). Struckman-Johnson et al. (1989) reviewed numerous studies, selected for their relatively good methodology, on driver improvement and confirmed the reality of this. One of the plausible explanations is the “relatively large stochastic component in crash involvement. The behaviour cited in violation [i.e., offence] statistics is, for the most part, under the volition of a driver despite the probabilistic nature of detection. In comparison, crash involvement is less dependent on the behaviour of a particular driver and more dependent on the environmental circumstances and the behaviour of other drivers. As a result, modification of behaviour is reflected more clearly in violations because they are more closely associated with the behaviour of a driver behaviour program participant”. Another possibility is that “driver improvement activities are ineffective in changing driving behaviour. Reductions in violations could actually be the result of skilful manipulation of the traffic safety system by driver improvement participants rather than any real change in driving behaviour”. (Both quotations are from Struckman-Johnson et al., 1989, p. 204.) In addition, in most datasets examined for this purpose, crashes are less frequent than offences, and therefore a convincing demonstration of an effect on crashes will be more difficult to obtain, especially if statistical testing plays a big part in the analysis. Struckman-Johnson et al. felt that by having looked at a lot of evidence together, they could rule out this (lack of statistical power) as being the chief explanation.

To say that interventions often affect offences but not crashes is not to deny that there are similarities between offences and crashes. Comparing individual drivers, offences are predictive of crashes (e.g., Stewart and Campbell, 1972; Gebers and Peck, 2003). Some of this work has distinguished between different types of offence (e.g., Chandraratna et al., 2006). However, it is uncertain to what extent a positive correlation is explicable by distance driven. An example of a study that did stratify drivers by distance driven is Lourens et al. (1999), who found that in all classes of reported distance driven, drivers who had been fined had a greater number of crashes than drivers who had not been fined.

8 Discussion

Our central findings are as follows.

- There is little or no difference between the DIP and Expiation groups in respect of crashes, some difference for moving offences, and a substantial difference for administrative offences.
- The offenders (the DIP and Expiation groups) are subsequently worse in terms of crashes, moving offences, and administrative offences than the baseline figures.

Thus it seems likely that DIP has no substantial effect, and that differences between the groups are due to factors that influence the decision whether to attend DIP or not. At this point, there might be a debate as to whether there is “really” a difference between the DIP

and Expiation groups in respect of crashes. One side would say the results directly concerning crashes consistently suggest no difference. The riposte would be that there is a difference in moving offences, speeding and drink-driving are behaviours that undoubtedly lead to increased risk of crashing, and it might be that there is too little crash data for the negative results to be conclusive.

We feel, however, that such a debate would at present be unproductive. The fact that drivers themselves chose whether to attend DIP or pay an expiation fee means that any differences found could not unambiguously be ascribed to the DIP: there could be relevant pre-existing differences between those who do attend the DIP and those who do not. The sex-age differences and indications of pre-existing differences in crashes and offending, noted above, make this credible. Thus one possible reaction to our findings is that we should not attempt too deep an interpretation, the methodology of a descriptive study is not robust enough.

We should also make clear that we have not demonstrated that the DIP has no effect, or that it is not cost-effective. There is not enough data to say one way or the other. We can offer the following remarks relevant to cost effectiveness. The important point is that the DIP is a cheap safety measure. Crashes are very expensive to the individuals involved and to society, and a saving of even (say) 1 casualty crash in a year might be considered to cover the costs and be sufficient justification for the DIP. On the basis of our results, it is credible that the effect of DIP is actually zero. But the associated sampling error is such that we cannot rule out the possibility that the DIP saves a few per cent of crashes and is cost-effective. (Actually, sampling error is likely to be underestimated by conventional methods of calculation, as these are based on assuming a Poisson distribution of crashes, which in turn assumes crashes are independent and occurring at a constant rate. There is empirical evidence --- for example, Hutchinson and Mayne, 1977 --- that the actual variability is rather greater than this. Possible reasons are year-to-year variations in the amount of traffic, or in the weather.)

It seems to us that Struckman-Johnson et al. left open two different possibilities. Expressed as questions, these are:

- Do interventions typically influence attitudes and behaviours that affect the risk of both crashes and offences, with the effect on crashes being hidden by the greater random component? If so, is it possible to develop a theory that will lead to a formula for estimating the effect on crashes from the effect on offences?
- Or do interventions typically affect attitudes and behaviours that are unrelated to crashes?

An important but difficult task for the future is to develop theoretical ideas about the relation between crashes and offences, and thereby get a better understanding of the plausibility (or implausibility) of effects of driver improvement programs on crashes.

Acknowledgements

We thank Daryl Taylor for helpful discussions about the DIP process. This study was funded by the South Australian Department for Transport, Energy and Infrastructure (DTEI) through a Project Grant to the Centre for Automotive Safety Research. The DTEI Project Manager was Trevor Bailey. The Centre for Automotive Safety Research receives core funding from both DTEI and South Australia's Motor Accident Commission. The views expressed are those of the authors and do not necessarily represent those of the University of Adelaide or the sponsoring organisations.

References

- Boyce, L and Dax, E C (1975) Driver education and driving offences in young males *Australian Road Research* 5 (7), 24-43
- Boyce, L, Dax, E C and Hagger, R (1979) The right to drive *Australian Road Research* 9 (1), 51-55
- Chandraratne, S, Stamatiadis, N and Stromberg, A (2006) Crash involvement of drivers with multiple crashes *Accident Analysis and Prevention* 38 (3), 532-541
- Gebers, M A and Peck, R C (2003) Using traffic conviction correlates to identify high accident-risk drivers *Accident Analysis and Prevention* 35 (6), 903-912
- Hutchinson, T P and Mayne, A J (1977) The year-to-year variability in the numbers of road accidents *Traffic Engineering and Control* 18 (9), 432-433
- Hutchinson, T P and Meier, A J (2004) Evidence-based road safety policy? Evidence-based transport policy? A discussion of randomised experimentation and meta-analysis in the evaluation of interventions, in Taylor, M A P and Tisato, P M (eds) *Papers of the 27th Australasian Transport Research Forum* Adelaide: Transport Systems Centre, University of South Australia
- Ker, K, Roberts, I, Collier, T, Beyer, F, Bunn, F and Frost, C (2003) Post-licence driver education for the prevention of road traffic crashes *The Cochrane Database of Systematic Reviews* 2003, Issue 3, and 2005, Issue 4
- Kloeden, C N and Hutchinson, T P (2006) *The crash and offence experience of drivers eligible for the South Australian Driver Intervention Program* Report CASR022, Centre for Automotive Safety Research, University of Adelaide
- Lourens, P F, Vissers, J A M M and Jesserun, M (1999) Annual mileage, driving violations, and accident involvement in relation to drivers' sex, age, and level of education *Accident Analysis and Prevention* 31 (5), 593-597
- Masten, S V and Peck, R C (2004) Problem driver remediation: A meta-analysis of the driver improvement literature *Journal of Safety Research* 35 (4), 403-425
- Senserrick, T and Haworth N (2005) *Review of literature regarding national and international young driver training, licensing and regulatory systems* Report No. 239, Accident Research Centre, Monash University, Clayton, Victoria
- Stewart, J R and Campbell, B J (1972) *The statistical association between past and future accidents and violations* Report from the Highway Safety Research Center, University of North Carolina, Chapel Hill
- Struckman-Johnson, D L, Lund, A K, Williams, A F and Osborne, D W (1989) Comparative effects of driver improvement programs on crashes and violations. *Accident Analysis and Prevention* 21 (3), 203-215
- Wundersitz, L N and Hutchinson, T P (2006) *South Australia's Driver Intervention Program: Participant characteristics, best practice discussion and literature review* Report CASR021, Centre for Automotive Safety Research, University of Adelaide