



Pre-driving adolescent attitudes: Can they change?

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ABSTRACT

The problem of reducing young drivers' high accident rates has been approached from many different angles but a primary focus has been to try and find ways of changing the attitudes and behaviours of young people who are already drivers. It is hypothesised that there is a link between pre-driver attitudes, intentions and their future driving behaviour. By changing pre-driver attitudes and/or intentions, individuals may mature into safer drivers. This study approaches this young driver problem by looking at pre-drivers' attitudes to driving to see how they change over time. The results from two questionnaires indicated significant gender differences and changes in responses (both long-term and short-term) over a 6-month period. It is concluded that adolescent attitudes and intentions towards driving remain fluid such that they may be positively influenced through pre-driver interventions, even if only temporarily. Regular pre-driver interventions could thus reinforce safe driving messages and create safety-conscious driving attitudes in the next generation of drivers.

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1. Introduction

Globally road accidents and injuries are the eighth leading cause of death among under 25s (WHO, 2007). According to the UK Department for Transportation (DfT, 2007) 16% more drivers aged between 16 and 19 years are killed today compared to 15 years ago. Young people however not only have very high rates of involvement in road traffic accidents as drivers or motor-cyclists, they have very high mortality rates in all road related accidents (Chliaoutakis, Darviri, & Demakakos, 1999; Gregersen & Berg, 1994; Mayhew & Simpson, 1989; Williams, 2003). As adolescents are known for their engagement in risky behaviours (Arnett, 1992; Bina, Graziano, & Bonino, 2006; Bingham, 2005; Bingham & Shope, 2004; Evans & Norman, 2003; Gulliver & Begg, 2004; Harre, Brandt, & Dawe, 2000; Jessor, 1987a, 1987b; Jessor, 1998) this could partially account for their over-representation in road traffic accidents.

In Great Britain 1431 people were killed in road traffic collisions during 2007, of these fatalities 296 were young car drivers aged from 17 to 24 years (DfT, 2008). To stress the alarming nature of these statistics and to put them into perspective, 17–24 year olds cover lower than average mileage compared to other driver sub-groups (Carcary, Power, & Murray, 2001). They make up only 7% of British driving licence holders but are involved in over 13% of all injury traffic accidents (DETR, 2000). The majority of collisions involving 17–21 year olds occur during the first year of driving (Achara et al., 2001).

These high accident figures for teen and young adult car drivers are not specific to Great Britain; they are mirrored throughout the world, which demonstrates that this phenomenon is very widespread (Wilde, 1994). In New Zealand, where the minimum driving age is 15 years, in 2006 38% of fatal motor vehicle collisions involved drivers aged 15–24 year olds, yet they represent only 7% of licence holders (MOT, 2007).

Drivers who regularly commit traffic violations tend to endorse the associated driving behaviour (Lancaster & Ward, 2002). In a study by Stradling and Meadows (2001) young drivers reported driving faster than other drivers and wanted

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to drive even faster. They also rated telematic speed control as less acceptable, committed more violations, sought more thrill from driving, reported themselves as less safe but not less skilled and had more crashes than other drivers. Interestingly, whilst females in this study reported driving as fast as young males, this trend among females decreased with age. This study therefore provides evidence to suggest that more effort may need to be put into targeting young male attitudes.

The attitude to speeding held by most drivers is that it is one of the least serious of all traffic offences (Brown & Copeman, 1975; Rothengatter, 1991). It is commonly believed that if only attitudes could be changed, appropriate behaviour would follow (Lonero & Clinton, 1997). Therefore the first approach directed towards speed reduction used by road safety professionals should be through targeted education, aimed at changing driver's attitudes to speeding behaviour. For example, one method of changing attitudes could be to highlight the inherent risks involved in engaging in speeding behaviour.

Studies have shown that adolescents who report positive attitudes towards traffic safety are less likely to report risky driving behaviour (Iversen, 2004; Ulleberg & Rundmo, 2003). Developing and maintaining positive attitudes to all aspects of traffic safety in both adolescents and pre-adolescents would therefore seem to be a priority. Particularly so, as research has shown that when young drivers perceive the risks related to traffic accidents as being high, they are less likely to engage in these risks (Ulleberg & Rundmo, 2003).

According to Harre et al. (2000), the age at which young people are developing a strong interest in driving and formulating attitudes about appropriate driving behaviour continues to decrease. Therefore, it is important for measures to be taken prior to adolescence to help aid the development and maintenance of positive traffic safety attitudes (Harre et al., 2000). In adolescents as young as 11 years old, significant differences have been found between males and females and what they expect from driving (Stradling, 1991). Waylen and McKenna (2002) carried out a study on pre-drivers aged 11–16 years and found that from 14 years old upwards, boys report that learning to drive will be significantly easier than girls. In their study there was a tendency for boys to report perceiving a greater increase in popularity as a result of driving than girls. This difference in perception between the sexes has been found to increase significantly with age, with the perception that driving increases popularity becoming less plausible the older girls get. The study also reported that boys seemed to accept violations to a significantly greater extent than girls.

Attempting to influence changes in drivers' attitudes and behaviour towards fast driving is a challenging task. Researchers have thus tried to identify those drivers who are at high-risk and targeted interventions directly at them. It is believed that with studies such as Stradling (1991) and Waylen and McKenna (2002) showing that adolescents as young as 11 years old have attitudes towards driving, pre-driving education maybe the way forward. This study explores adolescent attitudes towards driving to see whether their attitudes remain stable or fluctuate over time. Fluctuations in adolescents' attitudes towards driving could provide an opportunity for pre-driving initiatives such as "Crash Magnets" (a pre-driver intervention designed by Road Safety Scotland) to reduce high-risk attitudes and stabilise them.

2. Method

2.1. Participants

Road Safety Scotland (RSS) recruited schools from across Scotland to take part in the study. Hundred and fifty-five participants from 12 schools (72 males, 83 females) aged 12–16 years (mean age = 14.1 years, SD = 1.13) participated in both parts of this longitudinal study.

2.2. Procedure

Road Safety Scotland (RSS) designed a pre-driver awareness campaign called "Crash Magnets" aimed at Scottish secondary school students in classes S3–S6 (corresponding to the final 3 years of secondary or high-school education). Schools across Scotland were contacted by RSS to see whether or not they would be prepared to take part in the study. The participating schools selected classes randomly containing between 10 and 21 students.

Participating schools were sent a copy of the "Crash Magnets" DVD for use during two or three lessons on issues regarding young people and driving. Teachers were provided with a learning resource pack that consisted of ten optional class activities and situation cards to aid class discussion.

The DVD was 58 min long and was divided into five sections. The topics covered on the DVD included passenger behaviour, the importance of wearing seat belts, dangerous driving behaviours such as drink-driving, using mobile phones, driving under the influence of drugs or alcohol and the consequences of car crashes. The DVD featured primarily adolescents who shared their attitudes and experiences of driving. The emergency services were also featured in the presentation with contributions from Strathclyde Police, the Ambulance service and the Fire service. There were also people speaking who had been involved in crashes, were severely injured in crashes, had been sent to a young offender's prison for reckless driving and a mother who had lost her two children to a 23 year old drink-driver.

Ten optional class activities and four sheets of quotes (from the DVD) were designed to be used to reinforce the messages presented in the "Crash Magnets" DVD and to encourage students to think about driving and the consequences of dangerous driving (such as using mobile phones whilst driving, drink-driving, drug-driving and speeding). A set of questionnaires ('Questionnaire 1') was also included in the "Crash Magnets" pack along with teachers' instructions. The instructions asked

the teachers to hand out the questionnaires to their students and informed them that the questionnaire had to be completed in two parts: part one to be completed before the lesson and part two to be completed after the DVD and lessons.

Six months after completing 'Questionnaire 1', RSS contacted the schools again by letter. The letter thanked the schools and teachers for taking part in the "Crash Magnets" intervention and for encouraging students to complete 'Questionnaire 1'. The letter also informed them about the final part of the study and asked them to get the same students to complete 'Questionnaire 2' (a set of questionnaires was enclosed). The letter informed the teachers and schools that unlike 'Questionnaire 1', 'Questionnaire 2' was not divided into parts and could be completed without interruption. A list of the classes that had completed 'Questionnaire 1' was included to facilitate the schools and teachers in remembering which classes had completed 'Questionnaire 1'.

3. Measures

The two questionnaires were designed to measure adolescent attitudes towards driving and were administered before, during and after the classroom-based pre-driver intervention (Road Safety Scotland's "Crash Magnets"). 'Questionnaire 1' consisted of two parts: part one – questions to be answered pre-intervention ('Time 1'); and part two – a selection of questions repeated from part one to be answered post-intervention ('Time 2'). In 'Questionnaire 2' the same questions that were asked immediately post-intervention ('Time 2') were asked again for a third time, 6 months post-intervention ('Time 3').

3.1. Questionnaire 1: part one ('Time 1')

Part one of the questionnaire ('Time 1') was divided into two sections and used five and seven-point Likert scales. The scales measured adolescent attitudes and intentions to engage in speeding behaviour (questions were extracted from the 'extended theory of planned behaviour' and included measures of moral norm; Parker, Manstead, & Stradling, 1995), and attitudes to 'speeding'/drink-driving' and 'not wearing seat belts' (questions adapted from Parker, Manstead, Stradling, and Senior (1998) Driver Attitude Questionnaire).

The extended 'theory of planned behaviour' (TPB) scale (Parker et al., 1995) was used to measure the pre-drivers' attitudes and intentions to speed (referred to as the TPB Speeding Scale), which included measures of personal norm (moral norm and anticipated regret). As Parker et al. (1995) designed the extended TPB scale for their study on licensed drivers, only those questions which were deemed to be relevant to pre-drivers were included in this study. There were eleven items in total (one regarding moral norms, two on anticipated regrets, four referring to attitudes to speeding, two on subjective norms, one on perceived behavioural control and one measure of intention) taken from Parker et al. (1995) original questionnaire and the wording slightly modified to apply to pre-drivers. Some of the TPB components were measured using more than one item (for example, attitudes to speeding were measured using four items), and responses to each of these facets were added together and averaged. All items were measured using a seven-point Likert scale with end points appropriate to the question (for example: 1 = strongly agree, 7 = strongly disagree; 1 = very likely, 7 = very unlikely; 1 = very easy, 7 = very difficult). A derived Cronbach's alpha value of 0.779 was calculated for all items.

The Driver Attitude Questionnaire (DAQ) was used to assess attitudes towards driving violations such as 'speeding', 'drink-driving' and 'not wearing seat belts'. There were 22 questions (nine speeding items, eight drink-driving items and five attitudes to not wearing seat belts' items). 16 items were taken from Parker et al. (1998) 40-item driver attitude questionnaire (DAQ). The DAQ consisted of four subsections (10 items in each section) measuring attitudes towards: 'drink-driving', 'speeding', 'over-taking' and 'close following'. The 16 items only addressed attitudes to 'speeding' and 'drink-driving' as it was felt that some pre-drivers might not have any knowledge about over-taking and close following. For the purposes of this study some items were removed that were felt to be irrelevant to pre-drivers and several new items were added. A new item was added to attitudes to 'drink-driving' ("its ok to drink and drive") and a third subscale 'attitudes to not wearing seat belts' was created. All 22 items were measured using a five-point Likert scale (1 = strongly agree, 5 = strongly disagree), the Cronbach's alpha for this scale was 0.851.

3.2. Questionnaire 1: part two ('Time 2')

Part two of the questionnaire ('Time 2') consisted of a selection of questions from part one, that were repeated in order to re-assess participants' attitudes and intentions. Four of the items that measured attitudes to speeding were included (responses to the four items were averaged), and one item on intentions regarding speeding. Three items from the DAQ measuring attitude towards 'speeding', 'drink-driving' and 'not wearing seat belts' were also included. In order to encourage the students to think about the questions and to not necessarily put down the same answer as before, the Likert scales were reversed.

3.3. Questionnaire 2 ('Time 3')

This questionnaire was completed 6 months after the previous questionnaire (i.e., post-intervention at 'Time 3'). It was designed to establish whether attitudes and intentions had changed during the intervening 6-month period.

Eight items from parts one and two of 'Questionnaire 1' were replicated in this section. As in part two of 'Questionnaire 1', four of the extended TPB items that measured attitudes to speeding were included in 'Questionnaire 2', one item on speeding intention and three items from the DAQ measuring attitude towards 'speeding', 'drink-driving' and 'not wearing seat belts' were included. This was the third time participants had answered these questions.

4. Results

Three sets of mean scores were calculated for the eight questionnaire items asked at each time period in Questionnaires 1 and 2 ('Time 1', 'Time 2' and 6 months later 'Time 3'), and for total mean speeding attitude (calculated by averaging the four TPB speeding attitude items at each time period). The means showed that participants' responses decreased over the three sampling points with one exception, responses to the TPB item 'attitude to speeding being un-enjoyable or enjoyable' increased (see Table 1). The results from a Wilcoxon's signed ranks test revealed that five items out of the 8 that were measured showed significant increases or decreases between 'Time 1', 'Time 2' or 'Time 3'.

Over the course of the study attitudes towards speeding became more favourable with participants believing speeding to be enjoyable. There were significant increases in 'attitudes to speeding being un-enjoyable or enjoyable' from 'Time 1' to 'Time 2' ($p < 0.05$) and between 'Time 1' and 'Time 3' ($p < 0.05$).

Attitudes towards driving faster than the speed limit decreased over the course of the study. Mean scores for differences in 'attitudes to driving faster than the speed limit' decreased significantly from 'Time 1' through to 'Time 3' ($p < 0.05$).

Attitudes towards travelling in a car without wearing seat belts decreased over the course of the study. Mean scores for differences in 'attitudes to not wearing seatbelts' decreased significantly from 'Time 1' to 'Time 2' ($p < 0.001$), from 'Time 2' to 'Time 3' ($p < 0.001$) and from 'Time 1' through to 'Time 3' ($p < 0.001$).

Attitudes towards drink-driving decreased over the course of the study. Mean scores for differences in 'attitudes to drinking and driving' decreased from 'Time 1' to 'Time 2' ($p < 0.001$), from 'Time 2' to 'Time 3' ($p < 0.05$) and from 'Time 1' to 'Time 3' ($p < 0.001$).

Intentions to engage in speeding in the future were also found to decrease from 'Time 1' to 'Time 2' ($p < 0.05$) and from 'Time 1' to 'Time 3' ($p < 0.05$).

4.1. Gender differences

Female's attitudes towards speeding being 'un-enjoyable' or 'enjoyable' increased significantly and moved towards the undesirable (risky) end of the scale over the three sampling periods (see Table 2). A Wilcoxon's signed ranks test revealed that females' attitudes increased significantly from 'Time 1' to 'Time 2' ($p < 0.001$) and from 'Time 1' to 'Time 3' ($p < 0.001$).

Males' attitudes towards driving faster than the speed limit decreased significantly and moved towards the desirable (less risky) end of the scale over the course of the study (see Table 2). A Wilcoxon's signed ranks test revealed that males' attitudes decreased significantly from 'Time 1' to 'Time 2' ($p < 0.001$) and from 'Time 1' to 'Time 3' ($p < 0.05$).

Both males' and females' attitudes towards travelling without wearing seat belts decreased significantly towards the desirable (less risky) end of the scale (see Table 2). A Wilcoxon's signed ranks test revealed that males' attitudes decreased significantly from 'Time 1' to 'Time 2' ($p < 0.001$) and from 'Time 1' to 'Time 3' ($p < 0.05$); females' attitudes decreased significantly from 'Time 1' to 'Time 3' ($p < 0.001$) and from 'Time 2' to 'Time 3' ($p < 0.05$).

Both males' and females' attitudes towards drink-driving decreased and moved towards the desirable (less risky) end of the scale from 'Time 1' to 'Time 3' (see Table 2). A Wilcoxon's signed ranks test revealed that males' attitudes decreased sig-

Table 1
Means and differences in mean scores.

	Time 1	Time 2	Time 3	Mean difference			Sig. change
	Pre-intervention	Immediately post-intervention	6 Months post-intervention	T2-T1	T3-T1	T3-T2	
<i>Scale 1–7</i>							
Safe/unsafe	2.05	1.99	2.24	–0.06	0.19	0.25	–
Reckless/cautious	3.10	2.89	2.86	–0.21	–0.24	–0.03	–
Un-enjoyable/enjoyable	3.78	4.32	4.44	0.54*	0.66*	0.12	Increase
Bad/good	2.60	2.59	2.68	–0.01	0.08	0.09	–
Total mean speeding attitude	2.88	2.95	3.05	0.07	0.17	0.1	–
Intention unlikely/likely	4.48	4.11	4.21	–0.37*	–0.27*	0.1	Decrease
<i>Scale 1–5</i>							
Ok to drive over speed limit	2.72	2.58	2.48	–0.14	–0.24*	–0.1	Decrease
Ok to not wear seat belts	1.84	1.56	1.48	–0.28**	–0.36**	–0.08**	Decrease
Ok to drink-drive	3.36	1.36	1.20	–2.0**	–2.16**	–0.16*	Decrease

** Significant difference ($p < 0.001$).

* Significant difference ($p < 0.05$).

Table 2

Means and differences in mean scores by gender.

	Males (n = 72)	Time 1			Time 2			Time 3			Mean difference			Sig. change
		Pre-intervention	Immediately post-intervention	6 Months post-intervention	T2-T1	T3-T1	T3-T2	T2-T1	T3-T1	T3-T2	T2-T1	T3-T1	T3-T2	
<i>Scale 1–7</i>														
Safe/unsafe	Males	2.40	2.30	2.74	–0.10	0.34	0.44	–	–	–	–	–	–	–
	Females	1.75	1.72	1.80	–0.03	0.05	0.08	–	–	–	–	–	–	–
Reckless/cautious	Males	2.99	2.96	2.79	–0.03	–0.20	–0.17	–	–	–	–	–	–	–
	Females	3.21	2.82	2.93	–0.39	–0.28	0.11	–	–	–	–	–	–	–
Un-enjoyable/enjoyable	Males	4.42	4.79	4.88	0.37	0.46	0.09	–	–	–	–	–	–	–
	Females	3.23	3.92	4.06	0.69**	0.83**	0.14	Increase	–	–	–	–	–	–
Bad/good	Males	3.09	3.02	3.00	–0.07	–0.09	–0.02	–	–	–	–	–	–	–
	Females	2.17	2.22	2.39	0.05	0.22	0.17	–	–	–	–	–	–	–
Total mean speeding attitude	Males	3.22	3.27	3.35	0.05	0.13	0.08	–	–	–	–	–	–	–
	Females	2.59	2.67	2.79	0.08	0.20	0.12	–	–	–	–	–	–	–
Intention unlikely/likely	Males	4.96	4.57	4.63	–0.39*	–0.33*	0.06	Decrease	–	–	–	–	–	–
	Females	4.06	3.72	3.84	–0.34	–0.22	0.12	–	–	–	–	–	–	–
<i>Scale 1–5</i>														
Ok to drive over speed limit	Males	3.22	2.78	2.82	–0.44**	–0.40*	0.04	Decrease	–	–	–	–	–	–
	Females	2.28	2.40	2.18	0.12	–0.10	–0.22	–	–	–	–	–	–	–
Ok to not use seat belts	Males	2.03	1.64	1.71	–0.39**	–0.32*	0.07	Decrease	–	–	–	–	–	–
	Females	1.67	1.50	1.29	–0.17	–0.38**	–0.21*	Decrease	–	–	–	–	–	–
Ok to drink-drive	Males	3.14	1.42	1.31	–1.72**	–1.83**	–0.11	Decrease	–	–	–	–	–	–
	Females	3.55	1.31	1.11	–2.24**	–2.44**	–0.20**	Decrease	–	–	–	–	–	–

** Significant difference ($p < 0.001$).* Significant difference ($p < 0.05$).

nificantly from 'Time 1' to 'Time 2' ($p < 0.001$) and from 'Time 1' to 'Time 3' ($p < 0.001$); females' attitudes decreased significantly from 'Time 1' to 'Time 2' ($p < 0.001$), from 'Time 2' to 'Time 3' ($p < 0.001$) and from 'Time 1' to 'Time 3' ($p < 0.001$).

Males' intentions towards engaging in speeding behaviour decreased significantly towards the desirable (less risky) end of the scale (see Table 2). A Wilcoxon's signed ranks test showed that males' intentions to speed decreased significantly from 'Time 1' to 'Time 2' ($p < 0.05$) and from 'Time 1' to 'Time 3' ($p < 0.05$).

Differences in males' and females' mean scores were calculated from 'Time 1' to 'Time 3' (see Table 3). Independent *t*-tests revealed that there were significant gender differences on TPB attitudes to speeding, with males reporting riskier attitudes towards speeding than females. Over the course of the study males consistently scored significantly higher than females on attitudes towards speeding being safe rather than unsafe, enjoyable rather than un-enjoyable, good rather than bad and on total mean speeding attitude.

Males reported consistently greater intentions to speed in the future over the three sampling points. Males scored higher than females on TPB speeding intention at 'Time 1' ($p < 0.001$, $d = 0.54$), 'Time 2' ($p < 0.001$, $d = 0.57$) and 'Time 3' ($p < 0.05$, $d = 0.49$; see Fig. 1).

Table 3

Gender differences in mean scores Time 1–Time 3.

	Time 1		Mean difference	Time 2		Mean difference	Time 3		Mean difference
	Pre-intervention			Immediately post-intervention			6 Months post-intervention		
	Males (n = 72)	Females (n = 83)	Males (n = 72)	Females (n = 83)	Males (n = 72)	Females (n = 83)			
<i>Scale 1–7</i>									
Safe/unsafe	2.40	1.75	0.65**	2.30	1.72	0.58*	2.74	1.80	0.94**
Reckless/cautious	2.99	3.21	–0.22	2.96	2.82	0.14	2.79	2.93	–0.14
Un-enjoyable/enjoyable	4.42	3.23	1.19**	4.79	3.92	0.87**	4.88	4.06	0.82*
Bad/good	3.09	2.17	0.92**	3.02	2.22	0.80**	3.00	2.39	0.61*
Total mean speeding attitude	3.22	2.59	0.63**	3.27	2.67	0.60**	3.35	2.79	0.56**
Intention unlikely/likely	4.96	4.06	0.90**	4.57	3.72	0.85**	4.63	3.84	0.79*
<i>Scale 1–5</i>									
Ok to drive over speed limit	3.22	2.28	0.94**	2.78	2.40	0.38*	2.82	2.18	0.64**
Ok to not use seat belts	2.03	1.67	0.36*	1.64	1.50	0.14	1.71	1.29	0.42*
Ok to drink-drive	3.14	3.55	–0.41	1.42	1.31	0.11	1.31	1.11	0.20

** Significant difference ($p < 0.001$).* Significant difference ($p < 0.05$).

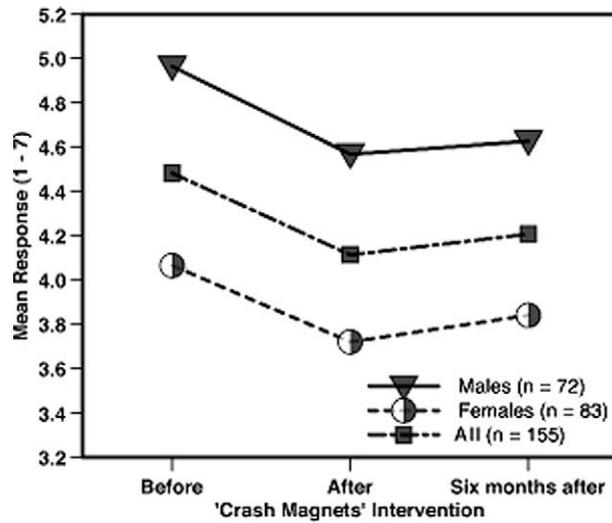


Fig. 1. Changes in adolescents' intentions to speed.

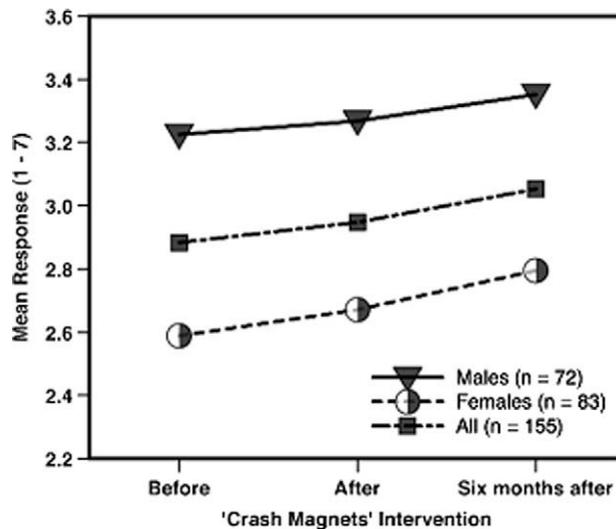


Fig. 2. Changes in adolescents' total mean attitudes to speed.

Males scored higher and had more positive attitudes towards speeding being safe rather than unsafe compared to females at 'Time 1' ($p < 0.001$, $d = 0.54$), 'Time 2' ($p < 0.05$, $d = 0.52$) and 'Time 3' ($p < 0.001$, $d = 0.73$). They scored significantly higher than females and had positive attitudes to speeding being enjoyable rather than un-enjoyable at 'Time 1' ($p < 0.001$, $d = 0.72$), 'Time 2' ($p < 0.001$, $d = 0.54$) and 'Time 3' ($p < 0.05$, $d = 0.48$). Males scored significantly higher than females and had more positive attitudes to speeding being good rather than bad at 'Time 1' ($p < 0.001$, $d = 0.64$), 'Time 2' ($p < 0.001$, $d = 0.64$) and 'Time 3' ($p < 0.05$, $d = 0.40$). They also scored higher than females on total mean speeding attitude at 'Time 1' ($p < 0.001$, $d = 0.65$), 'Time 2' ($p < 0.001$, $d = 0.59$) and at 'Time 3' ($p < 0.001$, $d = 0.54$; see Fig. 2).

Males had consistently riskier attitudes to both speeding and travelling without wearing seat belts compared to females. Females scored significantly lower on DAQ 'attitude to speeding' at 'Time 1' ($p < 0.001$, $d = 0.89$), 'Time 2' ($p < 0.05$, $d = 0.41$) and 'Time 3' ($p < 0.001$, $d = 0.65$). They also scored significantly lower than males on DAQ 'attitude to not wearing seat belts' at 'Time 1' ($p < 0.05$, $d = 0.36$) and at 'Time 3' ($p < 0.05$, $d = 0.52$).

5. Discussion

The results from this study have confirmed that pre-driving males hold more undesirable (risky) attitudes towards driving violations such as 'speeding' and 'not wearing seat belts' compared to females. The results showed that they also reported being more likely to engage in speeding behaviour in the future compared to females. It was not surprising to see that males'

attitudes were riskier than females as literature in the driving domain has consistently shown that males are riskier than females in both their attitudes and their driving behaviour (Laapotti, Keskinen, Hatakka, & Katila, 2001; Parker, Manstead, Stradling, & Reason, 1992). Therefore, it would appear that more attention needs to be paid to lowering the undesirable driving attitudes and intentions of adolescent males in particular.

Having identified males as being high scorers on the questionnaire items and classed them as 'higher risks' on the roads compared to females, it was encouraging to see that their attitudes towards the acceptability of driving faster than the speed limit, drink-driving and travelling without wearing seat belts had reduced (and had thus become less risky) over the course of the study. Over the 6-month period from 'Time 1' to 'Time 3' their attitudes towards driving faster than the speed limit, drink-driving and their intentions to engage in speeding behaviour had reduced significantly (females' attitudes towards drink-driving had also reduced over the 6 months). Males' attitudes towards travelling without wearing seat belts also decreased significantly from 'Time 1' to 'Time 3', however, between 'Time 2' and 'Time 3' their scores began to increase. Although this increase was not found to be significant in this study it may warrant further investigation to determine whether the original decrease from 'Time 1' to 'Time 3' was due to the effects of the pre-driver intervention.

Scores for both genders tended to be on or under the mid-point of the scale (which was 4), although males scored higher than females on TPB items. Mean responses to the speeding intention item were nearer '5' on the scale, whereas self-reported attitudes and intentions were neutral or towards the desirable (less risky) end of the scale. Males also scored higher than females on attitudes towards driving violations items (DAQ) but again their mean scores for both genders on these items tended to be below the mid-point of the scale. Therefore, along with the TPB items, DAQ attitude responses tended to be neutral or towards the desirable end of the scale. These results were very encouraging as they showed that the adolescents in this study did not hold very risky attitudes to driving violations and other components of the theory of planned behaviour when applied to speeding.

Regardless of gender, there were significant attitude changes over the three time sampling periods (from 'Time 1' to 'Time 3' 6 months later) and also changes in intentions to speed in the future. Attitudes towards driving violations ('speeding', 'not wearing seat belts' and 'drink-driving') decreased over the course of the study. Intentions to speed in the future decreased from 'Time 1' to 'Time 3', with adolescents reporting less intentions to speed.

Attitudes towards speeding being 'un-enjoyable or enjoyable' increased significantly over the three sampling periods (and thus became riskier) for both males and females. These results indicated that attitudes towards speeding had become more favourable, with participants believing speeding to be enjoyable. In contrast to this increase, attitudes towards speeding being 'unsafe or safe', 'reckless or cautious' and 'bad or good' decreased from 'Time 1' to 'Time 2' (thus becoming less risky). By 'Time 3', scores for attitudes towards speeding being 'unsafe or safe' and 'bad or good' had increased (thus becoming riskier) and were above scores at 'Time 1'. Although these decreases and increases in attitude scores were not significant it was felt necessary to report them as they may warrant further investigation. These fluctuations could simply be characteristic of adolescence, which is often regarded as a time when adolescents are trying to stabilise their attitudes, but they may also be reflecting temporary attitude changes that have been induced by the "Crash Magnets" pre-driver intervention.

The fact that adolescents' attitudes towards speeding being enjoyable increased over the course of this study whilst the other attitudes towards speeding temporarily decreased could simply show that this particular attitude towards speeding is impervious to changes by interventions. Further investigation is needed to examine whether this pre-driver attitude towards speeding is more predictive of future risky driving behaviour than other attitudes towards speeding.

The theory of planned behaviour (Ajzen, 1991) postulates a link between attitudes, intentions and behaviour. It is important to address adolescents' positive pre-driving attitudes towards driving violations and intentions to engage in speeding (and other driving violations), if their engagement in future risky driving behaviour is to be reduced. By intervening before adolescents become drivers it may be possible to prevent them from habitually carrying out the behaviours they already have sympathy with as pre-drivers.

This study has shown that attitudes towards driving among adolescents are in a state of fluctuation. Pre-driver education initiatives could therefore be used to create desirable attitudes towards driving among adolescents before their attitudes become established and less malleable. Further investigation is required to determine the approximate age at which driving attitudes begin to form and the age at which driving attitudes become permanent. This information could then be used to help road safety professionals develop a successful pre-driver curriculum.

The practical nature of this study resulted in several limitations. Methodologically, it was not possible to include a control group. RSS, who sponsored the "Crash Magnets" intervention, pragmatically could not justify the non-provision of the intervention to those who were offered it. It is therefore difficult to conclude whether or not the changes in attitudes and intentions were due to developmental/maturational changes or influenced by the "Crash Magnets" intervention they received. However, findings relating to 'Time 2' data collection immediately after the intervention, cannot reasonably be dismissed in terms of potential developmental or maturation effects. The reduction in scores that were recorded provides some evidence that the "Crash Magnets" pre-driver intervention was successful at reducing pre-driving adolescents' attitudes and intentions that would thus emphasise the potential need for pre-driver education in schools. Future replications of this study should incorporate a control group to circumvent this limitation in the design. Within the road safety domain, particularly in local government, there are substantial opportunities to learn from interventions undertaken at schools and local communities. However, it is rare for road safety professionals to be able to incorporate scientific evaluations into their interventions at present. Currently within the UK road safety community there is a move towards evidence-based practice in the work culture, supporting the transfer of knowledge to and from the workplace through partnerships with universities.

It was also not known whether any previous pre-driver interventions had taken place at the schools that participated in this study. Also, as the use of the class activities included in the teachers' "Crash Magnets" pack were optional it is not known which of the activities, if any, the teachers used in their lessons to accompany the DVD. The number or type of activities chosen may have had more or less of an effect on the attitude changes that were recorded. Future replications of this study should not only incorporate a control group but also ask teachers to report back which activities they chose and whether their students had received school-based pre-driver interventions in the past.

This study has revealed variance in pre-driving adolescents' attitudes and intentions towards driving over a 6-month period. It may be possible for pre-driving interventions to stabilise pre-driver attitudes and reduce risky attitudes and intentions. However, further research into the effects of pre-driving interventions is needed to see whether this is possible. Further research is also needed in order to validate identified links between pre-driving attitudes, behaviour, intentions and post-driving attitudes and behaviours. Establishing these would provide further objective evidence of the need for pre-driver initiatives, such as RSS's "Crash Magnets", and the potential value of regular implementation, so that they can have a real safety impact on the next generation of drivers.

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