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Driver2020 – an evaluation of interventions designed to improve safety in the first year of driving

Report D4: Summary of findings

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DRIVER 2020

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Executive summary

Background, and the Driver2020 trial

It is a known challenge in road safety that young and novice drivers are at greater risk of collisions, for reasons due to both their age and inexperience[1-6]. The Department for Transport commissioned TRL to undertake the Driver 2020 trial; the trial evaluated the effectiveness of five interventions identified in previous DfT research[31] as promising 'voluntary' approaches to reduce the risk to young and novice drivers in their first year of driving.

Three interventions were delivered to learner drivers:

- A logbook intervention to encourage pre-test practice (with participants in this group having a small incentive of a discount on learner driver insurance).
- A hazard perception training package to increase this skill.
- A classroom-based education intervention focusing on a range of knowledge, skills, and attitudes.

Two interventions were delivered to novice drivers, after they had passed their test:

- A mentoring agreement – a set of web-based materials to work through with a mentor such as a parent – to allow novice drivers to agree and set voluntary limits on high-risk situations, such as driving at night and when carrying passengers.
- A telematics app to coach participants on their driving behaviour with the aim of improving it (with weekly 'treat' incentives and monthly entries into a prize draw for safe scores).

Design and method

The trial was designed with two arms – one for participants recruited at the beginning of learning to drive ('learners') and one for participants recruited at the point of passing their test ('novices'); each arm had its own control group. On registration, participants were assigned randomly to one of the groups in their arm of the trial, with those in intervention groups being offered the opportunity to engage with their respective intervention. There were minimal or no incentives for engagement with the interventions; this was designed to reflect what would be seen in real-world voluntary delivery.

Participants were offered surveys at four time points – upon passing their driving test and then at 3-, 6-, and 12-months post-test. These surveys asked about demographics, driving, any collisions, and a range of other measures relating to the attitudes, behaviours and other factors targeted for change by the various interventions. Participants were given a £5 retail voucher or charity donation for each survey completion, and offered entry into an overall prize draw to win a year's car insurance and other lower value prizes. Some participants were also asked to take part in short interviews to discuss various aspects of the interventions, including their response to the intervention, and any barriers they had

experienced to engagement. Interview incentives were a £10 retail voucher or charity donation.

Three strands of analysis were undertaken. The first used statistical modelling to analyse the effect of the interventions on the number of collisions in the first year of driving reported by all participants who provided survey data, regardless of whether they engaged with any intervention they were offered. This provides an estimate of the real-world effectiveness of an intervention at the population level, which depends not only on how well an intervention works for those who use it, but also on how many people use it.

The second analysis strand used various statistical tests to understand the effects of the interventions on relevant surrogate outcome measures, just for those participants who engaged with their assigned intervention (and matched control group participants). Surrogate measures were things that were either known to be associated with collision risk (for example self-reported speeding or near misses) or were targeted by the different interventions (for example amount and breadth of pre-test driving practice, or self-reported driving style).

The third analysis strand was qualitative in nature, and was undertaken on the entire interview dataset, encompassing both arms of the study. It sought to identify themes in what interviewees said about what helped, or acted as a barrier to, engagement with the interventions.

Participants and recruitment

The trial took place in Great Britain. In the novice arm of the trial, 12,307 participants were recruited into the trial through a registration survey; of these, 6,848 provided complete survey datasets (2,356 mentoring agreement, 2,234 telematics, 2,258 control). In the learner arm, 16,214 participants were recruited; of these, 3,292 provided complete survey datasets (916 logbook, 682 education, 769 hazard perception training, 925 control). All participants were aged between 17-24 at registration.

The COVID-19 pandemic had significant impacts on the trial, the main one being the availability of driving tests. For learner participants, only 8,727 were able to pass their practical test and provide data for the study. The COVID-19 pandemic did not impact the delivery of the interventions to participants with the exception of the education intervention, which moved to an online delivery format after the pandemic. Since all groups were affected by the pandemic, the comparison between intervention groups and the relevant control group remained valid and the overall trial design remained unaffected, aside from the education intervention, which needed to be delivered online for some participants (rather than the original face to face approach). The lower numbers than anticipated in the learner arm also meant that, especially for the surrogate outcome measures, some comparisons potentially had lower statistical power than had been planned.

Interviews were carried out with 134 participants, split between 78 who were asked about their engagement with their respective intervention, and 56 who were asked about their choice not to engage.

Limitations

Several limitations to the study design should be considered when reading the findings and conclusions.

- The data were gathered during the COVID-19 pandemic, which would have affected learning and post-test driving. Generalisability to future circumstances in which there is no global pandemic may be affected.
- The sample is biased towards females and is an opportunity sample, which limits generalisability.
- The self-selecting nature of the sample (both in terms of registering for the trial and in terms of providing survey data) means that the findings cannot necessarily be generalised to all learner and novice drivers in Great Britain. However, the design (randomised allocation to groups) does mean that self-selection bias should not play any role in group differences.
- Most data are self-reported meaning some social-desirability effects may be present, and data reflect the interpretation of participants to survey questions.
- The engagement with interventions was at a very low level, meaning the findings might not reflect what would happen with greater engagement.
- Some groups had smaller-than-planned samples, meaning that some very small effects may have been missed due to lower statistical power.
- The findings related to surrogate measures provides us with evidence of the behaviour change that results from the interventions as these analyses only include those who engaged; however, the very low numbers engaging with some interventions mean that some very small effects may have been missed.
- The findings only cover the first year of driving and cannot be extended beyond this period (for example we cannot say whether behaviour would be impacted beyond this period, or whether any changes seen would persist).
- Two specific limitations are noted for the additional interviews carried out with a subset of participants: potential response bias in non-engagement interviews, possibly skewing reasons for non-engagement, and a greater gender imbalance in the subset sample compared with the overall trial sample, potentially introducing gender bias to the interview findings.

Findings and discussion

None of the interventions were found to reduce self-reported collisions in the first year of driving. Based on the trial sample, this finding suggests that offering these interventions on a similar voluntary basis to learner and novice drivers aged 17-24 in Great Britain would be unlikely to lead to any measurable reduction in collision risk.

An important contextual factor to consider when interpreting this finding is that engagement with interventions was very low with only between 3% and 16% of people offered an intervention engaging with it.

Interviews with participants in the trial revealed that the following features of interventions were important for encouraging engagement, or were appreciated:

- Being perceived as useful for licence acquisition (for example passing the theory test).
- Being perceived as useful for post-test development (for example 'pacing').
- Involving the opportunity for self-reflection.
- Being easy to use and reliable.

The low engagement rates lend greater importance to the findings from the surrogate measures. Table 0-1 summarises these. Only statistically significant findings are shown, and it should be noted that most effects are very small in magnitude – meaning that the differences between the intervention and control participants are very small, so even statistically significant differences should not necessarily be expected to change safety outcomes (for example collisions) to a great degree.

Table 0-1: Summary of statistically significant findings for participants who engaged with the interventions

Intervention	Surrogate measure and effect (relative to control group)	Likely safety impact
Mentoring agreement	A higher proportion of engagers reported they had set limits for driving with peer-age passengers, and for driving in the dark, in their first 6 months of driving.	Would likely improve
	Engagers reported a lower proportion of their driving as being in the dark 4-6 months after test pass.	Would likely improve
Telematics	Engagers reported a driving style that was more 'inattentive, careless, irresponsible and risky'.	Would likely reduce
	Engagers reported a lower proportion of their driving as being in the dark 7-12 months after test pass.	Would likely improve
Logbook	Engagers reported a higher proportion of their *learning* to drive as being with passengers in the car.	Safety impact unclear
Hazard perception training	Engagers reported a lower number of attempts to pass the theory test (suggesting higher hazard perception skill).	Would likely improve
	Engagers reported a lower frequency of driving above the speed limit in the first 3 months of post-test driving.	Would likely improve
Education	Engagers reported a lower proportion of *learning* to drive as being in the dark.	Safety impact unclear
	Engagers reported a higher proportion of their *learning* to drive as being on dual carriageways.	Safety impact unclear

Of these findings, those from the hazard perception training and mentoring agreement interventions are most promising, given their consistent direction in relation to safety

improvements that would be expected from the resulting changes to driving behaviours. Note that, for the telematics intervention, it is not clear whether the effect on driving style is a genuine change in style or a memory effect whereby feedback from the telematics app is recalled, and influences the response to the driving style questions.

Coincidentally, the data collection in the project spanned the period in which the COVID-19 pandemic occurred. It therefore provided an opportunity to understand the impact of the pandemic on learning to drive and on post-test driving, as well as serving as a useful recent dataset to examine more general features of young and novice drivers (such as the effects of post-test experience).

Statistically significant differences were found between those who passed their test before the pandemic and those who passed after, with those who passed before being at greater risk of having a collision in their first 12 months of post-test driving, and this difference being much larger in the learner arm. The importance of post-test experience in reducing risk was also confirmed, and again this statistically significant effect was larger in the learner arm.

Forthcoming research by TRL, beyond the Driver2020 project, could examine some of these findings in more detail.

Conclusion and recommendations

The Driver2020 project has found no evidence that any of the three interventions offered to learner drivers, or the two offered to novice drivers, reduced collisions in the first 12 months of post-test driving for 17-24 year old drivers when offered on a voluntary basis.

When only participants who had engaged with the interventions were considered, all interventions were associated with statistically significant changes in relevant surrogate measures, relative to the control group, though not always in the direction expected. The results from the mentoring agreement and hazard perception training interventions were most encouraging in their likely impacts on safety.

Further work with the Driver2020 dataset could help further elucidate the effects of the COVID-19 pandemic on learning to drive and on early post-test driving in young and novice drivers. The dataset can also be used more generally to examine young and novice drivers, and the long-understood road safety challenge they present.

1 Background and context

A large evidence base has shown that novice drivers are at a greater risk of being involved in a road collision than are more experienced drivers. This is for reasons associated with novice drivers' typically younger age, and their relative lack of on-road driving experience[1-6].

The Driver2020 study was undertaken to evaluate the effectiveness of five interventions designed to reduce collisions in novice drivers aged 17-24 in Great Britain in their first year of driving. This included answering the following research questions:

- How effective are the interventions at reducing collisions in the first 12 months of post-test driving?
- How effective are the interventions at changing relevant surrogate safety measures, in those participants who engaged with the interventions?
- What were the factors that led participants to engage with the interventions, and the barriers that stopped them doing so?

This report presents a brief, high-level summary of the study. A more detailed description of the study and its findings may be found in the other reports delivered as part of the work. These three reports cover the effectiveness of interventions delivered to novice drivers[7], the effectiveness of interventions delivered to learner drivers[8], and interviews with learners and novices regarding their engagement with the interventions[9].

1.1 The challenge of young and novice drivers

Existing evidence on young and novice drivers shows that both their young age and their lack of driving experience are important contributors to their greater collision risk[1-6]. For a given level of exposure (for example mileage), novice drivers get safer as they mature and as they accumulate on-road experience.

It is generally accepted that *multiple* age- and experience-related factors contribute to this greater risk. Age-related risk factors are likely to include new freedoms around socialising and personal expression that happen in adolescence, and immaturity in those brain areas known to inhibit impulsive thoughts and behaviours[10-12]; this is relevant as impulsivity is associated with riskier driving behaviour[13,14]. Experience-related risk factors include a lack of hazard perception skill[1] and a lack of understanding about appropriate driving behaviour in specific conditions such as on bends, and at night[15,16]. There are also specific driving situations in which young novice drivers are known to be at particular risk of being involved in injury collisions. These are driving at night, and driving with similar-aged passengers in the vehicle[17,18].

Two broad approaches have been taken internationally to address the high collision risk of young and novice drivers. The first has been to take a system-focused approach in designing the licensing system to address multiple age- and experience-related factors[19]. For example, graduated driver licensing systems have been successful in lowering risk[20] in countries such as the US, Canada, Australia and New Zealand, using minimum learning periods to increase age at licensure (to address age-related factors) and using post-test controls on driving at night and carrying peer-age passengers (to address experience-related factors and known

high risk situations). Building hazard perception testing into the licensing system has also been beneficial[1]; this again addresses an experience-related deficit by requiring that a minimum level of hazard perception skill be demonstrated before solo driving is allowed.

The second broad approach has been to focus on various techniques of educating and training learner and novice drivers to equip them with knowledge, skills, and attitudes to keep themselves safe. Such approaches have been less successful than system-focused licensing approaches in improving safety[21-29].

1.2 The Driver2020 study – origins and overall approach

In the 2015 Road Safety Statement[30] the Government committed to "Undertaking a £2 million research programme to identify the best possible interventions for learner and novice drivers" (page 8). The Statement also set the context for this research programme by stating the following in paragraphs 1.11 and 1.12:

> "1.11: Ten years ago, there were fewer options for reducing the elevated collision risk within the young driver population. Many foreign governments placed legislative 'graduated driver licencing' restrictions on their young people. These options include restricting driving to the hours of daylight or not allowing the carriage of passengers, for months or even years after passing tests.
>
> "1.12: Technology is one of the ways that we can help young drivers be safer. Technology is now emerging that can manage novice driver risk in a more bespoke way without restricting the freedoms of all of our young people. In short, there are modern and sophisticated non-legislative alternatives that treat each young driver as an individual with their own distinct risk profile."

Thus, the programme that defined the scope of the Driver2020 study was focused on finding non-legislative interventions that were best suited for trialling.

The year after the publication of the Road Safety Statement, a DfT-funded review[31] identified (on the basis of an evidence review and stakeholder feedback) those non-legislative interventions that were most promising; five interventions were taken forward for trialling by DfT. Three were for delivery to learners: a logbook intervention to encourage pre-test practice, a hazard perception training package to increase this skill, and a classroom-based education intervention focusing on a range of knowledge, skills, and attitudes. Two interventions were for delivery to novice drivers, after they had passed their test: a mentoring agreement to help drivers set voluntary limits on high-risk situations such as driving in the dark and when carrying passengers, and a telematics app to coach participants on their driving behaviour with the aim of improving it.

The study commenced in April 2017 and was registered at the ISRCTN registry (https://www.isrctn.com/ISRCTN16646122).

It is important to note that the COVID-19 pandemic had a major impact on the timeline of the study, falling during the learning-to-drive process or affecting the post-test driving (or both) of a majority of the study participants.

1.3 Structure of this report

The remainder of this report presents a summary of the method, the findings (including the impact of COVID-19 pandemic) and the recommendations from the Driver2020 study. These are presented in Sections 2, 3 and 4 respectively.

2 Method

The Driver2020 study was a randomised controlled trial, meaning that participants were randomly allocated to either an intervention group, or to a control group. The study was split into two arms, one for those interventions delivered to learner drivers and one for those delivered to novice drivers. People who registered their interest in taking part (through an online registration survey that took around 10 minutes to complete) were assigned either to one of the treatment groups or the control group in their respective arm of the study. In all treatment groups, participants were given the opportunity to engage with the respective intervention on offer if they wished (a voluntary approach); in the control groups no interventions were offered.

In both arms, participants were asked to complete online surveys at four time points (surveys took around 15 minutes to complete) in addition to the one they completed at registration. These time points were when they passed their driving test, and then again at 3-, 6-, and 12-months post-test. The surveys asked about demographics, driving (e.g. mileage, road types), any collisions, and a range of other measures relating to the attitudes, behaviours and other factors targeted for change by the various interventions. Some participants in each of the treatment groups were also invited to take part in a telephone interview (taking 20-30 minutes) to discuss various aspects of the interventions, including their response to the intervention, and any enablers or barriers to engagement they had experienced. Recruitment proceeded with the intention of obtaining an equal male/female mix for each intervention, and on the basis of their level of engagement with their intervention.

The study sought to understand what impact the interventions had on collision involvement in the first 12 months of driving, and on some surrogate measures (see section 2.2.2). It also sought to understand what helped and hindered engagement. The research questions were:

- How effective are the interventions at reducing collisions in the first 12 months of post-test driving?
- How effective are the interventions at changing relevant surrogate safety measures, in those participants who engaged with the interventions?
- What were the factors that led participants to engage with the interventions, and the barriers that stopped them doing so?

Surrogate measures investigated were things that were either known to be associated with collision risk (for example self-reported speeding or near misses) or were targeted by the different interventions (for example amount and breadth of pre-test driving practice, or self-reported driving style). Each intervention targeted a different set of measures – these are described in the more detailed reports for the learner and novice arms of the study.

2.1 Participants

In both arms of the study combined, 28,521 people registered to take part.

In the novice arm 12,307 people registered to take part; of these 6,848 provided complete survey datasets (2,356 mentoring agreement, 2,234 telematics, 2,258 control). They were aged 17 to 24 years old at registration and had passed their practical test no more than four weeks before. Recruitment for the novice arm took place between October 2019 and January 2021.

In the learner arm 16,214 people registered to take part; of these 3,292 provided complete survey datasets (916 logbook, 682 education, 769 hazard perception training, 925 control). An additional 115 participants in the learner arm were contacted by phone to provide (verbally) data on collisions, near misses and mileage. The numbers in the learner arm were much smaller than had been planned, due to the impact of COVID-19 on driving test availability. Participants in the learner arm were aged 17 to 24 years old at registration and either intended to begin learning to drive in the next two months or had already begun learning to drive but with only up to 10 hours on-road practice so far. Recruitment for the learner arm took place between January 2019 and March 2020.

Across both arms of the study, 134 participants also took part in interviews. These interviews took place after the opportunity to engage with the relevant intervention had finished (for learners, this was after test pass; for novices, this was after completing 12 months post-test driving).

Participants were drawn from across Great Britain, with all countries represented. The characteristics of the final samples in each of the groups, and those interviewed, are shown in section 3.1.

Participants were provided with £5 vouchers (or equivalent charity donation) for each survey they completed (see section 2.2.2); they were also invited to enter a prize draw (four top prizes of a year's car insurance, and other prizes such as iPads) to be undertaken at the end of the study. Participants who took part in an interview were provided with a £10 voucher (or equivalent charity donation).

Participants in the treatment groups were encouraged to take part in the interventions with only modest incentives in some cases that were designed to reflect the kinds that would be seen in real-world, voluntary delivery. Most interventions were simply offered with some encouragement about benefits – for example describing the potential benefits of the intervention for driver skill or safety – although in two interventions tangible incentives were offered. For the telematics intervention, participants could earn modest weekly rewards like coffee vouchers for scoring well and could lose one of 12 prize draw entry tickets for driving badly, in a given month (this telematics prize draw was separate from the main trial prize draw). This tangible incentive structure in the telematics group was intended to mimic the potential insurance-related delivery mechanism for this intervention. For the logbook, a small discount on learner driver insurance was offered.

The self-selecting nature of the trial sample means that the findings cannot necessarily be generalised to all learner and novice drivers in Great Britain. However, the trial design (randomised allocation to groups) does mean that self-selection bias should not play any role in group differences.

2.2 Materials

2.2.1 Interventions

Five interventions were evaluated by comparing the various outcomes for participants in the intervention groups with those in a control group, who received no additional intervention from the study. Each intervention was designed to reduce the number of collisions through acting on some surrogate measure, shown ***in bold italics*** in each description below. For more detailed descriptions of the interventions, see the main study reports on the learner and novice arms[7,8].

Mentoring agreements: web-based materials for use by novice drivers and mentors (for example parents) in voluntarily setting restrictions on early post-test driving. Designed to decrease the ***amount of driving with peer-age passengers*** and ***amount of driving at night.***

Telematics: an app-based intervention that provided feedback to novice drivers on their driving style, with various incentives provided. Designed to increase the ***safety of post-test driving style***, including ***speeding behaviour*** and ***amount of driving at night***.

Logbook: an app for learner drivers to use to plan and log their lessons (with instructors or with other supervising drivers). Designed to increase ***on-road practice in total (ideally to achieve 100 hours)*** and increase the ***range of driving conditions and road types covered***, during the learning period.

Hazard perception training: a set of three e-learning modules for learner drivers, two delivered throughout the learning phase and one immediately on passing the practical test. Designed to improve ***hazard perception skills***.

Classroom-based (later, due to COVID-19, e-learning) education: an education intervention in which attendees take part in several activities. Designed to equip them with knowledge and skills, and ongoing self-monitoring strategies, to make them safer as drivers; focused on decreasing the ***amount of driving with peer-age passengers***, ***amount of driving at night***, and ***driving while tired***, on increasing the ***safety of post-test driving style***, and on increasing ***on-road practice in total*** and the ***range of driving conditions and road types covered***.

Each of the interventions was designed by the delivery partner working with the project team, and with academic expert advisors. Logic models were provided for each intervention, and these were used to design the survey materials used to measure effectiveness – these are available in the supplementary appendix for the project[32].

2.2.2 Surveys

Participants were invited to complete online surveys at registration (10-15 minutes approximately), when they passed their practical driving test, and then 3-, 6- and 12-months post-test. Variables measured in the surveys were of two main types. First, there were 'matching variables' that potentially needed to be accounted for in the analyses; one example of this is mileage, which itself is highly correlated with collisions[1] (the more someone drives, the more they are exposed to risk). Second, there were 'outcomes' – things that the interventions were designed to change. Some questions related to the COVID-19

pandemic were also added in April 2020, to understand self-reported impacts of this on learning and post-test driving.

The **registration survey** collected informed consent to take part in the study, along with contact details and driver number. It also collected matching variables including a 30-item form of the Big-Five Personality Inventory[33]. All this information was associated with a unique participant ID number, so that participants could be randomised to a group and their data from the various surveys could be matched.

The **test pass survey** asked questions about the participant's learning to drive experience. This included the types of roads they practised on, and the amount of practice they had with instructors and with other supervising drivers; both of these were outcome variables targeted by the logbook intervention. The survey also contained items on various matching variables.

The **3-, 6- and 12-month post-test surveys**, in addition to matching variables such as mileage, asked for the number of collisions that the participant had been involved in the period of interest. This was the main outcome measure. These surveys also included the items listed below, that served as some of the surrogate outcome variables for the interventions. All were included because either they served as a good general surrogate measure for safety (for example near misses and the Driving Events scale have been shown to be related to collisions[1]) or because they were measuring something that was directly targeted for change by one of the interventions – one of the causal links in the logic model underpinning the intervention's design:

- Near misses
- Six items from the Hazard Involvement/Driving Events scale[34]
- Frequency of driving while tired, and driving over the speed limit
- Attitudes towards setting limits on post-test driving for new drivers
- Self-reported limits set on post-test driving
- Proportion of mileage driven with peer-age passengers, and in the dark
- Scales measuring driving style[35].

While subject to some biases such as the potential for participants to answer in socially desirable ways, self-reported surveys provided a cost-effective way of collecting data from the many thousands of participants involved and have offered many insights in previous studies of this kind[1,5,6].

2.2.3 Topic guides

For the interviews, separate topic guides were created for each intervention and level of engagement; topic guides were updated based on lessons learned from early interviews during the process. Engagement was measured differently for each intervention since each required different actions from participants. The topic guides were designed to ask participants about their experience of learning to drive and their engagement with the intervention content in a semi-structured format, lasting typically between 20 and 30 minutes. They were updated in April 2020 to allow for additional information to be collected on how the pandemic affected participants' experience of learning to drive.

2.2.4 Other measures

Theory test data (from the test that was passed) were collected from the Driver and Vehicle Standards Agency (DVSA). Originally, it had been intended that hazard perception scores were going to be collected as this was a key outcome measure for the hazard perception training intervention group; unfortunately, DVSA was unable to deliver hazard perception scores for participants as originally planned.

2.3 Design

Each arm of the study used a randomised encouragement design. This meant that in each arm of the study, participants were randomly assigned (see main study arm reports for details[7,8]) to either a control group, or to a treatment group. In the treatment groups, participants were encouraged (but not required) to engage with the respective intervention for that group through communications from the intervention provider, pointing out the potential benefits of the intervention in question.

Three analyses were undertaken. The first used statistical modelling (generalised linear modelling) to analyse the effect of the interventions on the number of collisions reported by drivers in their first year of driving. This analysis was undertaken on all participants who provided survey data (even those who did not engage with the interventions). This was done to provide an estimate of the real-world effectiveness of each intervention at the population level; this depends not only on how well an intervention works for those who engage with it, but also on how many people use it. The analysis first built a base model to control for factors such as age, sex and mileage, and used mixed-effect modelling to check the effect of experience.

The second analysis used various statistical tests to understand the effects of the interventions on relevant surrogate outcome measures, just for those participants who engaged. The criterion for 'engagement' varied by intervention and can be seen in the main study arm reports[7,8]. Because the sample sizes in the 'engager' groups were much lower than had been hoped (due to lower than expected engagement levels and the lower number of participants in the learner arm in total due to the impact of COVID-19) some non-significant effects that may have reached significance with larger samples are highlighted, although caution should be exercised in their interpretation.

The third analysis was qualitative in nature, and was undertaken on the entire interview dataset, encompassing both arms of the study. It used thematic analysis to identify themes in what interviewees said about what helped, or acted as a barrier to, engagement.

2.4 Procedure

The broad procedure for participants was the same for both arms of the study in terms of interacting with the research materials. After finding out about the study, those who wished to sign up completed the registration survey. Those eligible were then sent the test pass survey after they passed their practical driving test, and then the 3-, 6- and 12-month surveys at the respective time points after their test pass.

In the novice arm, the main way people found out about the study (84% of those recruited) was via a regular email (approximately every two weeks) sent by DVSA to a random sample of between 6,000 and 12,000 17-24-year-old recent test passers who had reported that they were open to taking part in research. In the learner arm the main method (94%) was a leaflet delivered with provisional licences. In both cases, potential participants were invited to visit the study website (www.driver2020.co.uk) and register their interest if they wished. After this, further survey invitations were anchored to a given potential participant's practical test pass date, with licence status updates being provided twice a week through a data-sharing agreement with DVSA.

After registering, participants in each intervention group were also contacted by the delivery partner and invited to engage with the intervention in question. For all interventions, engagement involved some kind of sign-up with the delivery partner, giving contact details, and then varied by intervention, with some simply requiring engagement with some materials immediately (for example mentoring agreement, e- learning education), some requiring engagement at some future point in time (for example hazard perception training modules, classroom education), and some requiring downloading of an app and its use over time during the learning process (logbook) or during post-test driving (telematics). All interventions and communications were branded 'Driver2020' to minimise confusion. Delivery partners were Royal Society for the Prevention of Accidents (Mentoring agreement), The Driving Instructors Association (Logbook), Trak Global (Telematics), DriverMetrics (Hazard Perception Training), and Agilysis (Education).

For the interviews relating to engagement, it was necessary to ensure that each participant had engaged to some extent with their respective intervention (for details see the report on the qualitative research in the project[9]). This information was obtained using system data from the intervention delivery partners. For each intervention, targeted invitations were sent via email asking participants if they would be willing to take part in an interview.

For interviews relating to non-engagement, invitations were sent when learners passed their test or when novices completed their first year of driving so that the invitation did not affect their level of engagement. Participants were selected who had *chosen* not to engage with the intervention they were offered, rather than selecting those who *did not receive or read* the original email invitation to sign up to the intervention.

2.5 Limitations

There are a number of limitations of the research that need to be considered when drawing conclusions. These are mentioned throughout the report and are listed here for clarity.

1. The data were gathered during the COVID-19 pandemic, which would have affected learning and post-test driving. Generalisability to future circumstances in which there is no global pandemic may be affected.
2. The sample is biased towards females and is an opportunity sample. Therefore, any generalisation of the findings to the population of interest (novice drivers aged between 17 and 24 years of age in Great Britain) needs to be done with caution.
3. The self-selecting nature of the sample means that the findings cannot necessarily be generalised to all learner and novice drivers in Great Britain. However, the design

(randomised allocation to groups) does mean that self-selection bias should not play any role in group differences.

4. The self-reported nature of most of the data means that conclusions again require caution; it is possible that the reported data are biased to some degree with social desirability; although this is not critical for the main comparisons between groups, it may mean that reported levels of behaviour are different to what would actually be observed.
5. Given the very low numbers of participants engaging with the interventions, and the low 'dosages' or 'amounts' of contact with interventions in those participants who did engage, the findings on collision reduction reflect only one potential set of roll-out conditions for the interventions.
6. Some groups had smaller-than-planned samples, meaning that some very small effects may have been missed due to lower statistical power.
7. The findings related to surrogate measures provides us with evidence of the behaviour change that results from the interventions as these analyses only include those who engaged; however even with these findings there are issues, in that the very low numbers mean that some very small effects may have been missed.
8. The findings also only relate to people who responded to the surveys, which further reduces their generalisability.
9. The findings only cover the first year of driving and cannot be extended beyond this period (for example we cannot say whether behaviour would be impacted beyond this period, or whether any changes seen would persist).
10. Two specific limitations are noted for the additional interviews carried out with a subset of participants: potential response bias in non-engagement interviews, possibly skewing reasons for non-engagement, and a greater gender imbalance in the subset sample compared with the overall trial sample, potentially introducing gender bias to the interview findings.

3 Findings

The sections below first outline the exploratory analysis of the samples in the two arms of the study (3.1), and then summarise the impact of COVID-19 (3.2). The main findings on effectiveness are then presented for collisions (3.3) and the surrogate measures used (3.4). Finally, the findings from the interviews are presented, on engagement with the interventions (3.5).

3.1 Exploratory analysis

The reader should refer to the main study arm reports[7,8] for more detailed discussion of the samples in the novice and learner arms, and to the qualitative research report[9] for the sample in the qualitative research. This section presents a simple table for each of these groups, exploring their personal characteristics, and those of their learning and post-test

driving. These data are explored in section 3.3 in the statistical modelling to test the extent to which the interventions affected collision risk.

The key insights from the exploratory analyses are:

- The sample in both arms was biased towards female participants (67% novice arm, 64% learner arm) meaning caution is needed in generalising findings.
- Around 67% of novices, and 84% of learners, were in full time education when they registered to take part in the study. The difference between the arms can be explained by the fact that novices registered after passing their test, while learners registered when they began learning.
- There was no evidence of spill-over or contamination effects (participants in one group being exposed to interventions from the others).
- There were no important differences between the groups on any variables.

3.1.1 Novice arm

Table 3-1 shows the main characteristics of the groups in the novice arm and of their pre and post-test driving. (Please note that, due to rounding, the sum of some proportions does not equal exactly 100%.) Statistical tests on these characteristics showed that the groups did not differ significantly on any of the characteristics. Other noteworthy points include the fact that around two thirds of the sample is female (fairly standard for studies of this type[1,36]) and participants acquired just over 70 hours of practice during the learning period. This is similar to that observed in the Cohort II study[1] – the last very large scale DfT study with this group in GB – but higher than observed in the 2017 practical driving test study[36] – the most recent study of this type in GB run by TRL on behalf of DVSA.

Table 3-1: Novice drivers in the Driver2020 trial – main characteristics by group

	Control	Mentoring agreement	Telematics
Number in sample	2,258	2,356	2,234
Mean age (years) at registration / test pass	18.8	18.9	18.9
Proportion male	33%	34%	34%
Proportion in quartiles 1-4 of Social Deprivation Index (1=most deprived)	Q1: 19% Q2: 23% Q3: 26% Q4: 32%	Q1: 20% Q2: 21% Q3: 26% Q4: 32%	Q1: 18% Q2: 23% Q3: 25% Q4: 34%
Proportion in f/t education	67%	67%	67%
Mean hours of driving practice before passing test	73.2	74.0	73.4
Proportion of mileage on road types when learning	Residential: 36% Towns/cities: 28% Country: 17% Dual: 16% Motorway: 2%	Residential: 36% Towns/cities: 28% Country: 17% Dual: 16% Motorway: 3%	Residential: 35% Towns/cities: 28% Country: 18% Dual: 16% Motorway: 2%

	Control	Mentoring agreement	Telematics
Proportion of mileage in situations when learning	W/passengers: 13% In dark: 22% Wet roads: 32%	W/passengers: 13% In dark: 21% Wet roads: 32%	W/passengers: 14% In dark: 22% Wet roads: 32%
Proportion of mileage on road types since test pass	Residential: 35% Towns/cities: 20% Country: 17% Dual: 17% Motorway: 11%	Residential: 35% Towns/cities: 20% Country: 17% Dual: 17% Motorway: 12%	Residential: 35% Towns/cities: 20% Country: 17% Dual: 17% Motorway: 12%
Proportion of mileage in situations since test pass	W/passengers: 43% In dark: 36% Wet roads: 36% For work: 28%	W/passengers: 43% In dark: 36% Wet roads: 36% For work: 28%	W/passengers: 43% In dark: 36% Wet roads: 35% For work: 28%
Mean mileage since test pass	5,635	5,918	5,881
Collisions per 1,000 miles of driving in the first 12 months post-test	0.039	0.038	0.041

Participants were asked about their awareness of the other interventions in the novice arm (potential spill-over effects) and the data indicated that this was not an issue. In addition, the proportion of those in each group with a telematics-based insurance policy (potential contamination for the telematics intervention) did not differ between the groups.

3.1.2 Learner arm

Table 3-2 shows the characteristics for the groups in the learner arm and of their pre- and post-test driving. (Please note that, due to rounding, the sum of some proportions does not equal exactly 100%.) No group differences were observed, and amount of learning and proportion of female participants was in line with the novice arm. The mean age at registration was substantially lower in the learner arm than in the novice arm, as learners were recruited when they began learning.

Table 3-2: Learner drivers in the Driver2020 trial – main characteristics by group

	Control	Logbook	Hazard Perception Training	Education
Number in sample	948	944	803	712
Mean age (years) at registration	17.7	17.8	17.8	17.9
Mean age (years) at test pass	18.5	18.5	18.6	18.6
Proportion male	35%	35%	36%	38%
Proportion in quartiles 1-4 of Social Deprivation Index (1=most deprived)	Q1: 16% Q2: 21% Q3: 26% Q4: 37%	Q1: 18% Q2: 20% Q3: 27% Q4: 35%	Q1: 16% Q2: 20% Q3: 24% Q4: 39%	Q1: 17% Q2: 21% Q3: 27% Q4: 34%
Proportion in f/t education	86%	82%	84%	83%

	Control	Logbook	Hazard Perception Training	Education
Mean hours learning	72.4	72.0	70.0	71.3
Proportion of mileage on road types when learning	Residential: 36% Towns/cities: 29% Country: 17% Dual: 15% Motorway: 2%	Residential: 36% Towns/cities: 28% Country: 19% Dual: 16% Motorway: 2%	Residential: 36% Towns/cities: 29% Country: 17% Dual: 16% Motorway: 2%	Residential: 35% Towns/cities: 29% Country: 17% Dual: 15% Motorway: 2%
Proportion of mileage in situations when learning	W/passengers: 13% In dark: 20% Wet roads: 29%	W/passengers: 13% In dark: 21% Wet roads: 31%	W/passengers: 13% In dark: 21% Wet roads: 29%	W/passengers: 13% In dark: 21% Wet roads: 31%
Proportion of mileage on road types since test pass	Residential: 33% Towns/cities: 20% Country: 18% Dual: 17% Motorway: 12%	Residential: 34% Towns/cities: 20% Country: 18% Dual: 17% Motorway: 12%	Residential: 33% Towns/cities: 20% Country: 18% Dual: 17% Motorway: 13%	Residential: 33% Towns/cities: 20% Country: 18% Dual: 17% Motorway: 12%
Proportion of mileage in situations since test pass	W/passengers: 41% In dark: 34% Wet roads: 34% For work: 25%	W/passengers: 44% In dark: 36% Wet roads: 35% For work: 27%	W/passengers: 43% In dark: 35% Wet roads: 34% For work: 27%	W/passengers: 42% In dark: 35% Wet roads: 34% For work: 26%
Mean mileage since test pass	5,582	5,845	5,534	5,470
Collisions per 1,000 miles of driving in the first 12 months post-test	0.045	0.045	0.041	0.042

As in the novice arm, spill-over effects (knowledge of the other trial interventions) and contamination effects (telematics insurance policy, and limit-setting on post-test driving by parents or guardians) were not found to be present.

3.1.3 Participant interviews

In total, 134 participants were interviewed for the qualitative research. Seventy-eight of these were interviewed about their engagement with the interventions, and 56 about their non-engagement or relatively low level of engagement. All intervention groups contained at least the target sample of 10 participants, except for the logbook non-engagement group, which contained eight. Several groups had a different gender split than was true of the entire Driver2020 study (roughly 2:1 female to male). The qualitative research report[9] contains a detailed breakdown of the age and gender split in each intervention group interviewed, and potential limitations.

3.2 Impact of COVID-19 pandemic on the study

The COVID-19 pandemic affected the trial in two main ways. The first was the availability of driver testing. Practical and theory tests were suspended from the 20th March 2020 and again in later lockdown periods (depending on country). Of the 6,848 novice drivers included in the analysis, 3,888 (57%) passed their test before this date. Of the final trial sample of 3,407 learners (the 3,292 who provided full survey datasets, and 115 more who were telephoned to provide just information on collisions, near misses and mileage, verbally), 1,403 (41%) passed before this date. The impact of reduced driving test availability was different on the two arms of the trial. For novices, who were recruited at test pass, the trial was able to resume recruitment and attain the target sample in each group once practical driving tests restarted. However, for learners, who were recruited when they began learning, many of the trial participants never had an opportunity to pass their practical test and then go on to provide data for the study through surveys. This is because in addition to delays due to suspensions of the driving test, when the restrictions were lifted, the subsequent demand was higher compared to before the pandemic. This meant that the final learner sample achieved was less than half of the original target.

A second impact of COVID-19 was on the amount of driving participants were able to undertake during the periods of lockdown, both when learning (for example due to driving lessons being cancelled or reduced private practice) and when driving post-test. This varied with lockdown rules and with the country in which participants resided.

Importantly, while these impacts may have had different effects on the arms of the study, they affected the intervention and control groups in the same way; the only exception to this was the necessary change of the education intervention to an online format after the beginning of the pandemic.

For both arms of the study, the period prior to 20th March 2020 is labelled as ‘pre-COVID-19’, and the period after this date is labelled as ‘post-COVID-19’. The major consequence of this variable for both arms of the trial was a reduction in mileage driven post-test for participants who passed their test pre-COVID-19. For novices, mean post-test mileage in the first 12 months of driving for the pre- and post-COVID-19 groups was 5,087 and 6,365 respectively. For learners, the corresponding means were 5,399 and 5,755. This shows that participants who passed before the pandemic started did less post-test driving in their first 12 months than those who passed after; presumably this was due to the fact that those who passed before the pandemic were more likely to have been limited by the early lockdowns in 2020, which were more restrictive than later ones in terms of non-essential travel. Both of these differences were statistically significant at the 5% level, although were small in magnitude.

The ‘pre-COVID-19/post-COVID-19’ variable was used in the analyses of the impact of COVID-19 on collision risk in section 3.3, along with another variable (self-reported impact of COVID-19 on learning to drive, for those affected) to check and control for any impact of COVID-19 on safety outcomes.

3.3 Impact of interventions and other factors on collisions

For each arm of the study, the impact of experience was modelled using mixed-effects modelling, a statistical technique, to check how driving experience affected collision risk. In order to check the effectiveness of the interventions in reducing collisions in the first year of driving, the collision risk for the treatment groups and control group in each arm of the study was compared. This was done using a multivariate regression method known as generalised linear modelling (GLM) and used all participants for whom data were available (even those who did not engage with the interventions), as the intention was to establish the real-world impact of the interventions on collisions (this depends on effectiveness and also engagement levels with the interventions). It was not possible to analyse collisions just for the subset of participants who engaged with interventions, as the number of engagers was far too small to support such an analysis.

In both arms of the study, the first step in the GLM was to build a base model. The base model contained those variables known on the basis of previous work[1,36] to have a relationship with collision risk, as well as variables measuring the impact of COVID-19. The purpose of building a base model is to establish associations between these variables and the collision risk measure, and control for these effects when assessing the impact of the interventions. For example, if it is found that mileage driven has a positive association with collisions, then any differences between the groups in mileage can be accounted for before the effect of the interventions is assessed.

The sections below discuss the findings from the modelling for the novice arm (3.3.1) and the learner arm (3.3.2), with section 3.3.3 providing a summary.

The key insights from this analysis are as follows:

- In the novice arm, higher mileage, passing the test before the COVID-19 pandemic, and a higher self-reported impact of COVID-19 on learning to drive were all associated with greater collision risk.
- In the learner arm, higher mileage, passing the test before the COVID-19 pandemic, and a higher age at test pass were all associated with greater collision risk. In addition, mileage had a weaker association with collision risk for those who passed their test before the COVID-19 pandemic than for those who passed after.
- None of the interventions, from either arm, were associated with any change in collision risk.

3.3.1 Novice driver interventions

Detailed information on the modelling and its comparison with previous work can be found in the report on the novice arm[7]. A summary of the findings from the GLM base model is shown in Table 3-3 below. In short:

- Higher mileage was associated with greater collision risk.
- Passing the driving test before the COVID-19 pandemic was associated with greater collision risk.

- A higher self-reported impact of COVID-19 on learning to drive was associated with greater collision risk.
- Age and gender did not have any association with collision risk.
- When the experimental group variable was added to the base model, analysis showed that the groups did not differ significantly on self-reported collisions in the first 12 months of driving post-test (**bolded** rows in Table 3-3 show if group makes any difference to participants' collision risk after other factors have been controlled). This was the case if collisions were modelled as a continuous variable (number of collisions) or as a binary outcome (no collisions or one or more collisions).

The analysis suggests, therefore, that if the mentoring agreement or telematics app was offered on a voluntary basis, with incentives that do not exceed what would be realistic in a live roll-out, there is no evidence in the Driver2020 study that a safety benefit would be expected at the population level (the population being all novice drivers in Great Britain aged 17-24).

Table 3-3: Main findings from collision modelling in novice arm of the Driver2020 study

Variable	Association with collisions	Description
Higher mileage	More collisions	As an example, for an 18-year-old male who passed their test pre-COVID-19, doubling mileage from 2,500 miles to 5,000 miles increased likelihood of a collision from 0.176 to 0.226
Passing test pre-COVID-19	More collisions	Those who passed their test before the COVID-19 pandemic were 1.26 times more likely to be involved in a collision than those who passed after
Higher age at test pass	No effect	No difference in collision risk for different ages
Gender = male	No effect	No difference in collision risk for males and females
Greater self-reported impact of COVID-19 on learning	More collisions	Greater self-reported impact is associated with more collisions (see novice arm report[7] for details)
Once the above variables had been controlled in the model, the below two variables were added to the model to see whether they had any effect on the collision outcome.		
Being in mentoring agreement group	**No effect**	**No difference in collision risk for mentoring agreement and control groups**
Being in telematics group	**No effect**	**No difference in collision risk for telematics and control groups**

In the mixed-effects modelling, increased driving experience (number of months of driving) was found to be associated with a lessening of collision risk over time, after mileage, age and gender were accounted for. Drivers get safer as they accumulate driving experience, which was expected[1,6].

3.3.2 Learner driver interventions

Detailed information on the modelling and its comparison with previous work can be found in the report on the learner arm[8]. A summary of the findings from the GLM base model is shown in Table 3-4 below. In short:

- Higher mileage was associated with greater collision risk
- Passing before the COVID-19 pandemic was associated with greater collision risk.
- A higher age at test pass was associated with greater collision risk.

- The collision-risk-increasing effect of mileage was weaker for those who passed pre-COVID-19 than for those who passed post-COVID-19.
- When the experimental group variable was added to the base model, analysis showed that the groups did not differ significantly on self-reported collisions in the first 12 months of driving post-test test (**bolded** rows in Table 3-4 show if group makes any difference to participants' collision risk after other factors have been controlled). This was the case if collisions were modelled as a continuous variable (number of collisions) or as a binary outcome (no collisions or one or more collisions).

The analysis suggests, therefore, that if the logbook, hazard perception training or education interventions was offered on a voluntary basis, with incentives that do not exceed what would be realistic in a live roll-out, there is no evidence in the Driver2020 study that a safety benefit would be expected at the population level (the population being all novice drivers aged 17-24).

Table 3-4: Main findings from collision modelling in learner arm of the Driver2020 study

Variable	Association with collisions	Description
Higher mileage	More collisions	As an example, for an 17-21-year-old male who passed their test post-COVID-19, doubling mileage from 2,500 miles to 5,000 miles increased likelihood of a collision from 0.188 to 0.231
Passing test pre-COVID-19	More collisions	Those who passed their test before the COVID-19 pandemic were up to 5.1 times more likely (depending on mileage) to be involved in a collision than those who passed after
Higher age at test pass	Fewer collisions	Being in the age category 22-27 (rather than 17-21) reduced the crash risk of a male driving 2,500 miles from 0.188 to 0.132
Gender = male	No effect	No difference in collision risk for males and females
Interaction between mileage and pre- or post-COVID-19 test pass	Mileage has smaller effect for pre-COVID-19 passers	The impact of doubling mileage (2,500 to 5,000) for those passing pre-COVID-19 was a 10% increase in collisions. This was smaller than the 23% increase in collisions seen from a doubling of mileage for all participants combined
Once the above variables had been controlled in the model, the below three variables were added to the model to see whether they had any effect on the collision outcome.		
Being in logbook group	**No effect**	**No difference in collision risk for logbook and control groups**

Variable	Association with collisions	Description
Being in hazard perception training group	**No effect**	**No difference in collision risk for hazard perception training and control groups**
Being in education group	**No effect**	**No difference in collision risk for education and control groups**

As in the novice arm, in the mixed-effects modelling, increased driving experience was found to be associated with a lessening of collision risk over time, after mileage, age and gender were accounted for. Drivers get safer as they accumulate driving experience, which was expected[1,6]. This effect was slightly stronger in the learner arm than in the novice arm; that is to say that the protective effects of each additional mile of experience was greater for those in the learner arm than those in the novice arm.

3.3.3 Summary and discussion of findings related to collisions

None of the five interventions had any detectable impact on collisions, when analysed at the level of all participants in the groups. This analysis tests the population-level effect of an intervention by including everyone who provided data even if they did not engage with the intervention; this is because population-level effectiveness is determined both by an intervention's efficacy (whether it works) and by how many people engage with it. It should be noted that the effect of the interventions on collisions could not be checked in the subsample of participants who engaged with them. This is because an analysis with the small sample sizes involved would not be sufficient to provide a robust test, for two reasons. First, it would be less likely than the full analysis to find any genuine effect, due to possessing too little statistical power. Second, it would be more likely that any effect found was spurious (just due to random variability in the data); again, this is a consequence of low statistical power[37].

As seen in section 3.5, engagement with the interventions in both arms of the study was very low. Thus, even if it was known that the interventions improved safety for those participants engaging with them (see section 3.4 for the surrogate measures analysis) any effectiveness at the population level would be reduced by the low engagement rates. An analogy would be that if a medicine existed that cured a disease with 100% effectiveness, and only 1% of the population took the medicine, then the real-world effectiveness of the medicine would be 1%.

COVID-19 affected collision risk in both arms of the trial, with the main effect being that passing the driving test before the pandemic began was associated with a greater likelihood of having a collision in the first year of driving (1.26 times more likely in novice arm, up to 5.1 times more likely, depending on mileage, in learner arm), although passing the driving test before the pandemic also reduced the collision-increasing impact of mileage in the learner arm.

3.4 Impact of interventions on surrogate measures

This section presents the findings from the analysis of the effect of the interventions on the surrogate measures. Surrogate measures were selected based on logic models that reflected the causal pathways through which the interventions were believed to work in improving safety (see the supplementary appendix document[32]. Surrogate measures were factors that were either known to be associated with collision risk (for example self-reported speeding or near misses) or were targeted by the different interventions (for example amount and breadth of pre-test driving practice, or self-reported driving style). They made it possible to look at any changes associated with the interventions just in participants who were known to engage to some degree. The sample sizes for engagers were sufficient to support analysis of these measures, as they did not suffer from the very low baselines/high variability associated with the collision variable (which consequently requires much greater sample sizes for analysis). The sections below note any effects of each intervention on these surrogate measures. These effects include both all statistically significant differences and a small number of non-significant differences. Since the sample sizes were much smaller than originally anticipated in the learner arm, attention has been drawn to trends in the data where differences were close to the significance threshold and that may have indicated genuine findings had the sample sizes been larger. These findings are discussed further in section 4.2. Although these non-significant findings are highlighted, caution should be exercised in their interpretation (with priority given to statistically significant findings) given the uncertainty about whether they would have reached significance if sample sizes had been greater.

It should be noted that most effects – even statistically-significant ones – are very small in magnitude, meaning that the differences between the intervention and control participants were very small.

3.4.1 Mentoring agreement

In those who engaged (148, 4%), the mentoring agreement intervention was associated with statistically significant changes in two surrogate measures relative to the control group. Table 3-5 shows these.

Table 3-5: Differences for engagers with the mentoring agreement intervention versus control group

Measure	Change	Likely impact on safety	Significance
Setting limits on driving	Increase in limits on driving with passengers set, compared with control group, in months 1-3 (10% versus 5%) and months 4-6 (12% versus 3%). Increase in limits on driving at night set, compared with control group, in months 1-3 (13% versus 7%) and months 4-6 (15% versus 5%).	Improvement	Statistically significant
Driving in the dark	Lower proportion of mileage at months 4-6 being driven in the dark compared with control group (26% versus 30%).	Improvement	Statistically significant

3.4.2 Telematics

In those who engaged (689, 16%), the telematics intervention was associated with statistically significant changes in two surrogate measures. Table 3-6 shows these.

Table 3-6: Differences for engagers with the telematics intervention versus control group

Measure	Change	Likely impact on safety	Significance
Driving in the dark	Lower proportion of mileage being driven in the dark 7-12 months post-test, with 36% for engagers versus 38% for the control group.	Improvement	Statistically significant
Driving style	Engagers self-reported a driving style in their first year of driving that can be described as more 'inattentive, careless, irresponsible and risky' than that of the control group.	Reduction	Statistically significant

3.4.3 Logbook

Those who engaged (121, 3%) with the logbook intervention were associated with a statistically significant change in one surrogate measure, and with one non-significant effect of note because it was at least approaching significance and with a larger sample it may have achieved it. Table 3-7 shows these.

Table 3-7: Differences for engagers with the logbook intervention versus the control group

Measure	Change	Likely impact on safety	Significance
Learning with passengers in car	Engagers reported having done more of their learning with passengers in the car – 20% for engagers versus 14% for the control group.	Unclear	Statistically significant
Total hours of practice pre-test	Increase in the total number of hours of practice – from 76.3 hours in the control group to 81.8 hours in the engagers.	Potential improvement	Non-significant

3.4.4 Hazard perception training

Those who engaged (412, 11%) with the hazard perception training intervention were associated with statistically significant changes in two surrogate measures, and with one non-significant effect of note. Table 3-8 shows these.

Table 3-8: Differences for engagers with the hazard perception training intervention versus control group

Measure	Change	Likely impact on safety	Significance
Driving above the speed limit	Engagers reported a reduction in the frequency of their driving above speed limit in months 1-3 post-test (mean frequency score 11.4 versus 14.3 for the control group, where 0 is never exceed the speed limit, and 100 is exceed the speed limit all the time).	Improvement	Statistically significant
Number of attempts to pass theory test	Engagers took fewer attempts on average to pass their driving theory test – mean of 1.19 attempts for engagers versus 1.37 attempts for control group.	Improvement	Statistically significant
Driving style	Engagers self-reported a driving style that could be described as less 'inattentive, careless, irresponsible and risky' and less 'irritable, impatient and intolerant'.	Potential improvement	Non-significant

3.4.5 Education

Those who engaged (181, 5%) with the education intervention were associated with statistically significant changes in two surrogate measures, and with two non-significant effects of note, that approached significance. Table 3-9 shows these.

Table 3-9: Differences for engagers with the education intervention versus control group

Measure	Change	Likely impact on safety	Significance
Learning in the dark	Engagers reported a lower proportion of their learning in the dark – 16% for engagers versus 21% for the control group.	Unclear	Statistically significant
Learning on dual carriageways	Increase in the proportion of their learning reported as being on dual carriageways – 17% for engagers versus 15% for the control group.	Unclear	Statistically significant
Learning with a supervising driver	Engagers reported less time learning with a supervising driver (i.e. not an Approved Driving Instructor) – 22.9 hours versus 29.7 for the control group.	Potential reduction	Non-significant
Driving above the speed limit	Higher frequency of reported driving post-test being higher than the speed limit (mean frequency score 17.8 versus 15.6 for the control group, where 0 is never exceed the speed limit, and 100 is exceed the speed limit all the time).	Potential reduction	Non-significant

3.5 Engagement with interventions

Engagement with the interventions was very low, even with very lenient criteria. Definitions of engagement were adopted as follows for each of the interventions:

- **Mentoring agreement:** an engager was defined as someone who had set at least one agreement using the web-based materials.
- **Telematics:** an engager was defined as someone who had downloaded the app and recorded at least one journey.
- **Logbook:** an engager was defined as someone who had downloaded the app and recorded at least one learning session.
- **Hazard perception training:** an engager was defined as someone who completed at least one hazard perception training module.
- **Education:** an engager was defined as someone who attended a course in person or completed at least one online module.

Using these criteria, 4% of participants in the mentoring agreement group engaged with the intervention, and 16% in the telematics group. In the learner arm, 3% of participants in the

logbook group engaged, 11% in the hazard perception training group, and 5% in the education group.

Transcripts from the 134 interviews with participants were analysed using structured thematic analysis in order to identify the key themes relating to engagement and non-engagement with the interventions, their experience learning to drive, and the impact of COVID-19. Discussion with intervention providers was also factored into lessons learned; these more specific practical points are covered in the Driver2020 engagement research report[9].

As the wider context for the findings about engagement, learning to drive and driving were reported by interviewed participants to be challenging but still very important. Learners interviewed understood that learning to drive is not easy, and they also said that they understood that the learning-to-drive process would not completely prepare them for driving after they passed their test. However, despite the cost and effort required, driving was reported by participants as an important life skill that is useful and provides flexibility and freedom of mobility.

All participants interviewed after the COVID-19 pandemic reported that it had a major effect on their learning-to-drive experience that led to an increase in feelings of stress and perceived difficulty of the learning-to-drive experience. Effects mentioned included those discussed previously in section 3.2: driving lessons and tests being cancelled, difficulties booking tests, and changes in learning and driving conditions. Some participants also reported that this resulted in the need to learn new skills, and a loss of confidence in their driving abilities.

The key insights from the analysis of interview data on engagement were as follows:

- An intervention being perceived as useful for licence acquisition (for example passing the theory test) was seen by interviewed participants as a reason to engage with it.
- An intervention being perceived as useful for post-test development (for example 'pacing') was seen by interviewed participants as a reason to engage with it.
- An intervention involving the opportunity for self-reflection was seen by interviewed participants as a reason to engage with it.
- An intervention being easy to use and reliable by interviewed participants encouraged engagement.

The main themes are described in some more detail below.

Interventions offered during learning stage that are perceived as being helpful to licence acquisition were attractive for engagement

"…some of the stuff what I've picked up on the video clips it was actually like I could relate it to questions on my theory" (hazard perception training, M, 20)

In the learner stage, the key motivation for learners interviewed appeared to be passing their test and progressing through the licensing process as fast as possible, even though they reported (unprompted) that the learning-to-drive process did not equip them with

everything they would need for post-test driving. Participants consistently mentioned their desire for content that would help them with licence acquisition, and especially the theory test. A possible interpretation of this finding could be that some non-engagement was driven by a perception that engaging with content that may *not* help in this respect was pointless. Additional content that would be in some way useful after the test (for example, knowledge that would help with the financial side of car ownership) was also reported as being desirable by the learners interviewed.

The shift to 'real driving' moves the focus to safety, but perceived helpfulness of interventions was still important for engagement

"So that's sort of given me a confident (sic) booster as to what shall I do, how can I improve" (mentoring agreements, M, 20).

Novices interviewed were more obviously focused on safety than learners interviewed. It appeared that the focus on 'passing the test' very quickly shifted to one of 'staying safe' once the realities of post-test, unsupervised driving hit home.

However, novice participants still fed back the importance of understanding what the benefits of the interventions would be for their post-test driving (for example helping them to 'pace' their development), to improve the attractiveness of those interventions.

Opportunities for self-reflection were appreciated

Across interventions, participants noted how much they valued the opportunity to reflect on their own driving, including potential risks and how they might overcome them.

"…it helps you in knowing your driving, how you can improve driving, noticing areas which you need to improve on to be a safer driver. And how to drive more safely on the roads basically" (telematics, F, 19)

This theme highlights the fact that, for all their focus on passing their test and gaining new-found freedoms, learner and novice drivers interviewed were capable of responding positively to a deeper consideration of the risks and nuances associated with motorised mobility once they engaged. Self-reflection may therefore be an important teaching technique to include in any interventions.

Getting 'the basics' right in terms of usability and communication was critical for engagement

"At first I used it a fair bit but after a few weeks I've kind of forgotten about it" (logbook, F, 19)

Many participants who did not engage were either unaware of the potential benefits of an intervention, or not convinced of them. For all interventions, participants also reported a desire for more reminders to help them remember to engage. Lack of usability and technical issues

were reported as reasons for disengagement with the interventions, highlighting the importance of these issues.

4 Discussion and conclusions

This section discusses the findings from the Driver2020 project, the relevance of the findings to the wider evidence base and draws conclusions.

4.1 Impact of interventions on collisions in the first 12 months of driving

None of the interventions were found to reduce the number of self-reported collisions in the first year of driving. Based on the trial sample, this finding suggests that if any of these interventions were offered on the same voluntary basis to novice drivers aged 17-24 in Great Britain, it would be unlikely that any measurable reduction in collision risk would be observed in this population.

An important contextual factor to consider when interpreting this finding is that engagement was very low with all interventions. Just 3% of participants offered the logbook intervention used it; the highest engagement was with the telematics intervention – with 16% of participants offered this intervention using it. This in itself is an important finding. It suggests attempting to reduce risk in newly qualified drivers by relying purely on the voluntary uptake of the technology- and education-based interventions evaluated in this study is not likely to succeed. This would be the case even if the interventions were effective at reducing collision risk for those who engaged – something that cannot be checked in the current dataset given that the samples of engagers were far too small to permit a reliable analysis. However, another way of evaluating the interventions in those participants who engaged with them is to look at surrogate measures that can give a reliable indication of change in smaller samples. This approach was built into the design of the Driver2020 study and is discussed below.

4.2 Impact of interventions on surrogate measures

Surrogate measures were selected from the logic models underlying the intervention design and reflected the causal pathways through which the interventions were believed to work in improving safety (see supplemental appendix[32]). These measures made it possible to look at any changes associated with the interventions just in participants who were known to engage to some degree.

Each intervention is discussed in turn below, in relation to impacts on surrogate measures.

4.2.1 Mentoring agreement

Engagement with the mentoring agreement was associated with large and statistically significant increases in the proportion of participants self-reporting that they had set limits for driving with peer age passengers, and for driving in the dark, in the first six months of driving. Although the absolute proportions of participants reporting that they set limits in the mentoring agreement group was still quite low (between 10% and 15% over the first six months of driving), they were higher than in the control group (3% to 7%).

The increased setting of limits seemed to lead to less self-reported driving in the dark at 4-6 months post-test. Engagers in the mentoring agreement group reported a slightly lower proportion of their mileage at this time point being in the dark than the control group (26% versus 30%); this finding was statistically significant. This is in line with previous studies on similar approaches in the US, which tend to show some changes in the ways risks are managed, but few major differences in more objective measures[28]. Nonetheless, the fact that an easily accessible set of web-based materials can lead to greater engagement with voluntary limits for these high-risk situations, and some small changes in driving behaviour in one of them in those participants who choose to engage, is promising.

4.2.2 Telematics

Engagement with the telematics intervention was associated with a very small but statistically significant reduction in the proportion of mileage reported as being driven in the dark at months 7-12 post-test. This is a promising finding.

Engagement with this intervention was also associated with a statistically significant increase in a self-reported driving style that was 'inattentive, careless, irresponsible and risky'. While the statistically significant difference was very small between the groups, this measure (a combined score from four of the items in a previously validated driving style measure[34]) is potentially important. It is not a desirable consequence of engaging with such an intervention, as such a self-reported driving style has been shown before to be associated with a greater overall crash risk in novice drivers[1]. It is not clear whether the effect was due to the telematics intervention actually leading to engagers adopting a slightly riskier driving style, or whether the feedback from the telematics app might have led to engagers having a more accurate awareness of their driving style than the control group participants. Further analyses of the telematics dataset (from the app) may be able to examine this further; for example, if the latter interpretation is correct, then it would be expected that engagers with greater 'risky driving' feedback from the app would self-rate their driving style as riskier.

With 'pay how you drive' insurance for young novice drivers remaining popular, the absence of any major safety benefits being demonstrated in the Driver2020 telematics intervention group is worthy of consideration and is in line with some previous research[36].

4.2.3 Logbook

The main mechanisms through which the logbook intervention was intended to work were via increasing the amount and breadth of practice obtained during the learning phase.

The only statistically significant change seen was in the proportion of learning reported as being done with passengers in the car. Logbook engagers, when compared with control participants, reported more time practising with passengers. Such an effect may potentially have a safety benefit through improving the degree of overlap between learning and post-test driving contexts[29]. However, the effect size was very small.

Due to the sample size of the study being much lower than expected (final samples were between a third to just under half of what was intended) non-significant effects that have

the potential to have been detected as statistically significant with a larger sample size are highlighted. Caution is needed in their interpretation, however.

For the amount of practice, there was a statistically non-significant difference in mean hours of total practice between the control group (76.3 hours) and the logbook engagers (81.8); this represents around a 7% increase. Regardless of whether this increase might have reached statistical significance had the sample been larger, the fact remains that this increase is still nowhere near the target of 100 hours set within the study for this group; this target was based on evidence reviewed in previous work[31] suggesting that a minimum of 100 hours of pre-test practice is likely to be needed before any safety benefits are seen post-test.

Taken as a whole, the logbook intervention findings suggest that a logbook app like the one tested could lead to very modest changes in the learning to drive of those who engage.

4.2.4 Hazard perception training

Engagement with the hazard perception training intervention was associated with statistically significant changes in two surrogate measures. First, engagers showed a reduction in their reported frequency of driving above the speed limit in their first three months of post-test driving (frequency score 11.4 versus 14.3 in control group, where 0 means 'never break limit' and 100 means 'always'). Although a small effect, this is an encouraging result for safety given the high correlation between driving at higher speeds and collision risk[38]. It is also aligned with previous findings in the hazard perception literature; for example, studies have shown that drivers (and riders) with higher levels of hazard perception skill chose lower speeds in response to hazardous road situations[39,40].

The second significant change was that engagers with the hazard perception training intervention took fewer attempts on average to pass their driving theory test (of which the hazard perception test is one part, along with the multiple-choice component). This finding would be predicted if the hazard perception training intervention increased engagers' hazard perception skill, as it would lead to them scoring higher on the test.

Two of the self-reported driving style factors ('inattentive, careless, irresponsible and risky' and 'irritable, impatient and intolerant') also had a non-significant association with hazard perception training engagement. Both of these driving style factors were safer (less 'inattentive…' and less 'irritable…') in the hazard perception training group than in the control group. These effects are also encouraging, although they failed to reach statistical significance. As noted however, in the learner arm there were lower sample sizes than anticipated, and for this reason such trends in the data deserve to be noted.

The hazard perception training intervention findings suggest that such an intervention delivered during learning to drive could have safety benefits if a way were found to ensure that people engage with it. Hazard perception is a skill known to be amenable to training and to be associated with collision risk[40-42].

4.2.5 Education

Engagement with the education intervention was associated with statistically significant changes in two surrogate measures, both from the learning phase. The first was that

engagers reported a lower proportion of their learning occurring in the dark (16% versus 21% for control group). The second was an increase in the proportion of their learning reported as occurring on dual carriageways (17% versus 15% for the control group). The effect sizes for these differences were small. The latter of these findings is likely to be useful for safety; getting more practice on faster roads should help with post-test exposure to such environments. The former finding is likely not desirable for safety, as less experience in the higher risk context of driving in the dark could mean drivers are less prepared for this post-test. Note however that the evidence base is not firm on the specific link between pre-test practice and post-test experience in these two contexts.

The very low engagement with this intervention, coupled with the lower numbers in the learner arm overall, also mean that the sample was much smaller than anticipated. Given this context it is also worth considering two differences that failed to reach statistical significance but where the result was close to the significance threshold. The first was that education engagers reported less time learning with a supervising driver (22.9 hours versus 29.7 for control group). The second was that they reported a higher frequency of their driving post-test being higher than the speed limit (frequency score of 18.4 averaged across the 12 months of post-test driving, compared with 15.9 for control group, where 0 means 'never break limit' and 100 means 'always').

These findings from the education intervention suggest that such approaches might usefully focus on encouraging attendees to gain experience in a wider range of situations during their learning.

4.3 Lessons learned regarding engagement

There were very low levels of voluntary engagement with the interventions.

Under a voluntary approach, two findings from the interviews are likely to be useful for encouraging engagement with interventions. First, participants noted that interventions perceived as being helpful for progressing and improving as drivers were more attractive for engagement, both in terms of passing the test, and helping novices develop as drivers post-test. For learners interviewed, helpfulness for passing the test (theory or practical) was a priority. Novices interviewed were focused on things that could help with further development when post-test driving began, including adjusting to the differences they perceived compared with learning – the shift in their thinking from 'passing the test' to 'staying safe'. The second general finding was that interventions that provided an opportunity for self-reflection were reported as being desirable by participants who engaged.

4.4 The impact of COVID-19 and post-test experience

While not the primary purpose of the study, coincidentally the data collection in the Driver2020 project spanned the period in which the COVID-19 pandemic caused disruption to candidates' ability to learn to drive, and to the availability of driving tests in Great Britain throughout 2020 and 2021. Another secondary consequence of the study is that it provided another opportunity to examine the impact of post-test experience on collision risk; previous work has shown that as experience is gained, collision risk goes down[1-6].

Participants who passed their test before the start of this disruption were more likely to report a collision in their first year of driving than those who passed after, with this difference being larger in the learner arm of the study (up to 5.1 times more likely, depending on mileage, in learner arm versus 1.3 times more likely in novice arm). It is hypothesised that this effect was due to the delay in licensure that was experienced by most of those participants who passed after the pandemic started. This is consistent with previous research into the effect of increased age at licensure on collision risk[1,5,6]. The reduction in collision risk observed may have been due to these participants being older by the time they passed, getting more experience on-road before they took their test (both known to be factors influencing collision risk) or other factors specific to the unique scenario presented by the pandemic (for example different driving conditions during lockdowns[43]).

In both arms of the study, the importance of post-test experience in reducing risk was confirmed. However the protective effects of each additional mile of experience was greater for those in the learner arm than those in the novice arm.

Future research could examine more closely the impact of COVID-19, the differences in its impact for the learner and novice arms, and differences in experience effects between the arms.

4.5 Conclusion

The Driver2020 project found no evidence that any of the three interventions offered to learner drivers, or the two offered to novice drivers, reduced collisions in the first 12 months of post-test driving for 17-24 year old drivers when offered under a voluntary approach. This finding refers to collisions for the whole sample of drivers, including those who did not engage with the interventions – a so-called 'intention to treat' analysis that establishes the real-world effectiveness of interventions.

Analysis of surrogate measures with the participants who engaged to some degree with the interventions suggests that modest changes in some variables are possible, particularly from the hazard perception training intervention and the mentoring agreement intervention.

None of the interventions, however, show any sign of improving safety for young and novice drivers to the extent shown by stronger, legislative approaches such as the introduction of hazard perception testing in Great Britain in 2002[1], or stronger approaches to licensing seen in other countries[20,21].

Further work with the Driver2020 dataset could help elucidate the effects of the COVID-19 pandemic on learning to drive, and on early post-test driving. The dataset can be used to understand this important group more generally.

References

1. **Wells P, Tong S, Sexton B, Grayson G and Jones E (2008).** Cohort II: a study of learner and new drivers. Volume 1: main report. Road Safety Research Report No. 81. London: Department for Transport.
2. **Mayhew DR, Simpson HM and Pak A (2003).** Changes in collision rates among novice drivers during the first months of driving. *Accident Analysis and Prevention*, 35(5), 683-691.
3. **McCartt AT, Shabanova VI and Leaf WA (2003).** Driving experience, crashes and traffic citations of teenage beginning drivers. *Accident Analysis and Prevention*, 35, 311–320.
4. **Sagberg F (1998).** Month-by-month changes in accident risk among novice drivers. *Paper presented at the 24th International Congress of Applied Psychology*, San Francisco, August 9–14.
5. **Forsyth E, Maycock G and Sexton B (1995).** *Cohort study of learner and novice drivers. Part 3: Accidents, offences and driving experience in the first three years of driving.* Crowthorne: Transport Research Laboratory.
6. **Maycock G, Lockwood CR and Lester J (1991).** *The accident liability of car drivers* (RR315). Crowthorne: Transport and Road Research Laboratory.
7. **Weekley J, Helman S, Chowdhury S, Hammond J and Hutton J (2024a).** *Driver2020 – an evaluation of interventions designed to improve safety in the first year of driving. Report D1: Effectiveness of interventions delivered to novice drivers* (PPR2009). Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.
8. **Weekley J, Helman S, Makosa H, Harpham N and Hutton J (2024b).** *Driver2020 – an evaluation of interventions designed to improve safety in the first year of driving. Report D2: Effectiveness of interventions delivered to learner drivers* (PPR2010). Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.
9. **Hitchings J, Holcombe A, Christie N, Weekley J and Helman S (2024).** *Driver2020 - an evaluation of interventions designed to improve safety in the first year of driving. Report D3: Delivery of interventions and engagement by novice and learner drivers* (PPR2011). Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.
10. **Romine CB and Reynolds CR (2005).** A model of the development of frontal lobe functioning: Findings from a meta-analysis. *Applied Neuropsychology*, 12, 190-201.
11. **Giedd JN (2004).** Structural magnetic resonance imaging of the adolescent brain. *Annals of the New York Academy of Sciences*, 1021, 77-85.
12. **Gogtay N, Giedd JN, Lusk L, Hayashi K, Greenstein D, Vaituzis AC, … and Thompson PM (2004).** Dynamic mapping of human cortical development during childhood through early adulthood. *Proceedings of the National Academy of Sciences*, 101, 8174-8179.

13. **Hatfield J, Williamson A, Kehoe EJ and Prabhakharan P (2017).** An examination of the relationship between measures of impulsivity and risky simulated driving amongst young drivers. Accident Analysis & Prevention. 103, 37–43. doi: 10.1016/j.aap.2017.03.019.

14. **Lazuras L, Rowe R, Poulter DR, Powell PA and Ypsilanti A (2019).** Impulsive and Self-Regulatory Processes in Risky Driving Among Young People: A Dual Process Model. Frontiers in Psychology, 10:1170.

15. **Clarke DD, Ward P and Truman W (2002).** *In-depth accident causation study of young drivers* (TRL542). Crowthorne: Transport Research Laboratory.

16. **Clarke DD, Ward P, Bartle C and Truman W (2006).** Young driver accidents in the UK: The influence of age, experience, and time of day. *Accident Analysis and Prevention*, 38, 871–878.

17. **DfT (2018).** *Young car drivers road safety factsheet (2016).* London: Department for Transport.

18. **Ouimet MC, Simons-Morton BG, Zador PL, Lerner ND, Freedman M, Duncan GD and Wang J (2010).** Using the U.S. National Household Travel Survey to estimate the impact of passenger characteristics on young drivers' relative risk of fatal crash involvement. *Accident Analysis and Prevention*, 42, 689-694.

19. **Senserrick T and Kinnear N (2017).** *Addressing young and novice-driver safety in Great Britain: developing a systems-based approach.* London: RAC Foundation.

20. **Russell KF, Vandermeer B and Hartling L (2011).** Graduated driver licensing for reducing motor vehicle crashes among young drivers. *Cochrane Database of Systematic Reviews*, 10, CD003300.

21. **Kinnear N, Lloyd L, Helman S, Husband P, Scoons J, Jones S, Stradling S, McKenna F and Broughton J (2013).** *Novice Drivers: evidence review and evaluation: pre-driver education and training, graduated driver licensing, and the New Drivers Act* (PPR673). Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory

22. **Clinton K and Lonero L (2006).** *Guidelines for evaluating driver education programs.* Washington, DC: AAA Foundation for Traffic Safety.

23. **Mayhew DR, Simpson HM and Robinson A (2002).** The safety value of driver education and training. *Injury Prevention*, 8(Supp. II), ii3–ii8.

24. **Roberts IG and Kwan I (2001).** School-based driver education for the prevention of traffic crashes. *Cochrane Database of Systematic Reviews*, Issue 3. Art. No.: CD003201. https://doi.org/10.1002/14651858.CD003201

25. **Christie R (2001).** *The effectiveness of driver training as a road safety measure. A review of the literature.* Victoria, Australia: Royal Automobile Club of Victoria.

26. **Vernick JS, Li G, Ogaitis S, MacKenzie EJ, Baker SP and Gielen AC (1999).** Effects of high school driver education on motor vehicle crashes, violations and licensure. *American Journal of Preventative Medicine*, 16(1), 40–46.

27. **Mayhew DR, Simpson HM, Williams AF and Ferguson SA (1998).** Effectiveness and role of driver education and training in a graduated licensing system. *Journal of Public Health Policy*, 19, 51–67.

28. **Groeger, J. A., & Banks, A. P. (2007).** Anticipating the content and circumstances of skill transfer: Unrealistic expectations of driver training and graduated licensing? *Ergonomics*, 50(8), 1250-1263.

29. **Helman S, Grayson GB and Parkes AM (2010).** *How can we produce safer new drivers? A review of the effects of experience, training, and limiting exposure on the collision risk of new drivers* (INS005). Crowthorne: Transport Research Laboratory.

30. **Department for Transport (2015).** *Working together to build a safer road system: British road safety statement.* Stationary Office.

    https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/487949/british_road_safety_statement_web.pdf

31. **Pressley A, Fernández-Medina K, Helman S, McKenna FP, Stradling S and Husband P (2016).** *A review of interventions which seek to increase the safety of young and novice drivers* (PPR781). Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.

32. **Weekley J and Helman S (2024).** *Driver2020 – an evaluation of interventions designed to improve safety in the first year of driving. Supplementary appendix – data collection surveys and intervention logic models* (PPR2034). Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.

33. **Soto CJ and John OP (2017).** Short and extra-short forms of the Big Five Inventory–2: The BFI-2-S and BFI-2-XS. *Journal of Research in Personality*, 68, 69-81.

34. **Quimby AR, Maycock G, Palmer C and Buttress S (1999).** *The Factors that Influence a Driver's Choice of Speed: A Questionnaire Study* (TRL325). Crowthorne: Transport Research Laboratory.

35. **Guppy A, Wilson P and Perry J (1990).** Driving attitudes and driving experience. In Benjamin, T. (ed.) *Driving Behaviour in a Social Context.* Caen, France: Paradigme

36. **Helman S, Wallbank C, Chowdhury S, Hammond J, Kinnear N, Buttress S, Jenkins R and Grayson G (2017).** *Transforming the practical driving test: final report* (PPR828). Crowthorne: Transport Research Laboratory.

37. **Button K, Ioannidis J, Mokrysz C *et al.* (2013).** Power failure: why small sample size undermines the reliability of neuroscience. *Nat Rev Neurosci* 14, 365–376 (2013). https://doi.org/10.1038/nrn3475

38. **Elvik R, Vadeby A, Hels T and Van Schagen, I. (2019).** Updated estimates of the relationship between speed and road safety at the aggregate and individual levels. *Accident Analysis and Prevention*, 123, 114-122.

39. **McKenna FP, Horswill MS and Alexander JL (2006).** Does anticipation training affect drivers' risk taking? *Journal of Experimental Psychology: Applied*, 12(1), 1-10.

40. **Helman S, Palmer M, Delmonte E and Buttress S (2012).** *Development of a video measure of hazard perception skill and a group discussion-based hazard perception training package for motorcyclists* (PPR615). Crowthorne: Transport Research Laboratory.

41. **Cao S, Samuel S, Murzello Y, Ding W, Zhang X & Niu J (2022).** Hazard perception in driving: a systematic literature review. *Transportation Research Record*, 2676(12), 666-690.

42. **Grayson GB and Sexton BF (2002).** *The development of hazard perception testing* (TRL558). Crowthorne: Transport Research Laboratory.

43. **Wegman F and Katrakazas C (2021).** Did the COVID-19 pandemic influence traffic fatalities in 2020? A presentation of first findings. *IATSS research*, 45(4), 469-484.

Driver2020 – an evaluation of interventions designed to improve safety in the first year of driving

The Driver2020 project evaluated the real-world effectiveness of five interventions designed to reduce collisions and risk in learner and novice drivers aged 17-24 in Great Britain. Three interventions were delivered to learner drivers. These were a logbook (designed to increase on-road practice), a hazard perception training e-learning intervention (designed to improve hazard perception skill) and a classroom-based education intervention designed to improve a number of safety-related attitudes and behaviours. Two interventions were delivered to novice drivers in their first 12 months of post-test driving. These were a mentoring agreement (designed to encourage drivers to set voluntary limits on high risk driving situations such as driving at night or in the dark and with peer-age passengers) and a telematics intervention (that provided feedback on driving style). Over 28,000 participants were assigned randomly to one of the treatment groups, or a no-intervention control group, in the learner or novice arm of the study. All participants were invited to complete surveys when they passed their practical driving test, and at 3-, 6- and 12-months post-test. The surveys collected data on learning to drive (for example types and amounts of practice) and post-test driving, including self-reported collision involvement.

None of the interventions reduced collisions relative to the control groups. Engagement with the interventions (which were offered on a voluntary basis with modest incentives designed to reflect what would be possible in a real-world roll-out) was low, at between 3% (logbook) to 16% (telematics). In those participants who did engage, the mentoring agreement and hazard perception training interventions were shown to have potentially the best safety benefits. Engaging with the mentoring agreement encouraged setting of limits on driving in the dark and driving with peer-age passengers in the first six months post-test, and with less self-reported driving in the dark 4-6 months post-test. Engaging with the hazard perception training intervention was associated with a reduction in the number of attempts needed to pass the theory test (consistent with an increase in hazard perception skill) and a lower frequency of speeding in the first three months of post-test driving. The other interventions had mixed findings.

Other titles from this subject area

PPR2009 Weekley J, Helman S, Chowdhury S, Hammond J and Hutton J (2024a). Driver2020 – an evaluation of interventions designed to improve safety in the first year of driving. Report D1: Effectiveness of interventions delivered to novice drivers. Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.

PPR2010 Weekley J, Helman S, Makosa H, Harpham N and Hutton J (2024b). Driver2020 – an evaluation of interventions designed to improve safety in the first year of driving. Report D2: Effectiveness of interventions delivered to learner drivers. Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.

PPR2011 Hitchings J, Holcombe A, Christie N, Weekley J and Helman S (2024). Driver2020 – an evaluation of interventions designed to improve safety in the first year of driving. Report D3: Delivery of interventions and engagement with them by novice and learner drivers. Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.

PPR781 Pressley A, Fernández-Medina K, Helman S, McKenna FP, Stradling S and Husband P (2016). A review of interventions which seek to increase the safety of young and novice drivers. Commissioned and funded by the Department for Transport. Crowthorne: Transport Research Laboratory.

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