Learner Driver Cycle Awareness Training (LDCAT) Evaluation Study

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What is the study about?

This is a training evaluation study. It involved testing learner (and other) drivers' cycle awareness, via a questionnaire, before and after they had completed Learner Driver Cycle Awareness Training (LDCAT). If the training works, then it would be expected that cycle awareness would be higher following the training than it was before. The study also allows us to explore how long the training effect lasts. The findings support these expectations: **cycle awareness *did* increase after LDCAT** and **remained at higher levels after a period of follow-up**. This document describes the study outcomes in more detail and how they were discovered.

Why is the study needed?

Increasing awareness of cyclists among car drivers is a way to tackle a key barrier to the widespread uptake of cycling. **If cycling is safer, and feels safer, individuals will be more likely to use it as a mode of transport**. Greater cycle awareness also has benefits for car drivers. It helps them to understand why cyclists ride as they do, develop better situation awareness, avoid hazardous situations, and encourage mode shift for when a bike may, in fact, be a better choice.

Increasing cycle awareness could be undertaken in a number of different ways. There are various technological or engineering interventions, such as in-vehicle warnings or different ways to design infrastructure. There are also softer, behaviour-based interventions of which training is a prime example. Cycling Scotland promotes several forms of cycle awareness training targeted at different road users. At one end of the scale is Bikeability training, aimed at young riders at the beginning of their bicycle careers. At the other end of the scale is PCAT (Practical Cycle Awareness Training) which is aimed at professional light and heavy goods vehicle (LGV/HGV) drivers. Learner Driver Cycle Awareness Training (LDCAT) is the topic of this study. **Learning to drive is a key stage in an individual's travel 'life-story' and an appropriate point to intervene with targeted cycle awareness training**.

There is a rich academic research-base on the general topic of training. In any training evaluation study what is actually being measured is something called training transfer. **The aim of training – put simply - is the extent to which learning during training transfers into real-world settings.** Training transfer can be estimated by how learning outcomes in training translate into measurable outcomes after training has taken place.

A key message from the wider training research is that despite training's prominent role in behaviour change interventions such as LDCAT, it is **rarely evaluated**. When evaluation does take place, measures of training effectiveness have often focused on training transfer at the immediate close of the training intervention. Training transfer is a complex phenomenon and evaluation of it over longer time periods is more valuable. **This study is novel and unique in two ways. It is novel in seeking to establish a formal evidence-base for LDCAT's effectiveness, and it is novel in doing so after a sustained period of follow-up.** Both of these features are uncommon in the wider training evaluation field and are very positive features of this study.

What is Learner Driver Cycle Awareness Training (LDCAT)?

The LDCAT course itself is inspired by, and based on, Cycling Scotland's successful PCAT course for HGV and LGV drivers. It is specifically designed to help learner drivers be safer on the roads. The training is designed to be the perfect opportunity to step into the shoes of more vulnerable road users, including those on bikes, on foot, and those with disabilities. It aims to provide participants with a greater understanding of their needs.

During the training learner drivers spend time in the classroom where they are taught about best practices to adopt around vulnerable road users. They also have the opportunity to spend time on the bike and step in the shoes of someone cycling with the guidance of an expert instructor. LDCAT is free of charge, takes approximately 3.5 hours to complete, and is normally undertaken at a host organisation such as a school.

Who took part in the study?

In total **381 participants** took part in the LDCAT evaluation study. They were drawn from a diverse range of schools from across Scotland, alongside individuals completing the training at a bike recycling organisation (6) and also a small number (16) of Approved Driving Instructors (ADIs). By far the largest majority (321 people) took part in classroom-based LDCAT concurrent with, or prior to learner driver instruction.

Participants completed a cycle awareness questionnaire before the training commenced, then again at the conclusion of the training. After that, an average of 130 days (minimum of 92 days, maximum of 154 days) elapsed before a smaller number of participants (25) completed the questionnaire again. This enabled the longer term effect of cycle awareness training to be investigated.

It is often difficult to recruit female participants into studies of this type for reasons that are not always clear. A long-standing criticism of transport studies in general, and cycling studies specifically, is that many of them are based on male dominated samples of participants. This study, however, is unique in not just having a large sample, but one that is **gender balanced**. Forty four percent of participants identified as female and 42% as male.

What data was collected?

A questionnaire was used for assessing the training transfer of cycle awareness. The questionnaire is a pre-existing one based on the learning outcomes of the LDCAT course. No similar cycling specific questionnaires were found in the mainstream scientific literature. In the absence of a robust alternative the decision was made to review, modify, and use the existing questionnaire.

The existing cycle awareness questionnaire already has a number of good questionnaire design aspects. It comprises 14 questions in total so is not excessively long. It uses a five point Likert scale from Strong Agree to Strongly Disagree. It has 10 questions for which the correct response is a

positive ‘Agree’ or ‘Strongly Agree’ rating. This is useful because participants find positive ‘agreeable’ questions easier to answer in a more definite (i.e. non neutral) way. The remaining four questions were ‘negative’ in that the correct response is a ‘Disagree’ or ‘Strongly Disagree’ rating. These negative questions serve as a useful check on the internal validity of the questionnaire. Participants who respond ‘correctly’ to the positive questions should also respond ‘correctly’ to the negative questions.

Minor modifications were made to the questionnaire. The questions themselves were subtly reworded from ‘questions’ to ‘statements’ about the intention to perform an actual behaviour. Behavioural intentions lie at the centre of the **Theory of Planned Behaviour**. This theory explains how an intention to perform a behaviour translates into ‘actual’ behaviour on the road. This gives the questionnaire theoretical validity.

Did LDCAT training change people’s cycle awareness?

Yes. When all the ‘pre-training’ responses were compared with all the ‘post training’ responses some statistically significant changes were detected. Prior to LDCAT training the participants scored the positive cycle awareness statements with a mean of 2.06 (firmly in the ‘Agree’ category). Immediately following LDCAT training this mean score reduced to 1.71, becoming closer to the ‘Strongly Agree’ category. After an approximately four month follow-up period, the smaller number of participants who completed the questionnaire again gave mean scores of 1.70. This is very close to the immediate post training value of 1.71 given previously. This means the training appears to ‘stick’ and does not necessarily fade over time.

In summary, **following LDCAT the participants now agree more strongly with statements like “I would slow down when approaching people cycling”** and this effect is maintained after an approximate four month follow-up period. This finding is not only statistically significant, it also represents a statistical ‘medium effect size’. With a large sample such as the one used in this study, it becomes easier to detect statistically significant differences even if they are very small. A medium effect size means the differences detected would actually be noticeable in real-world settings.

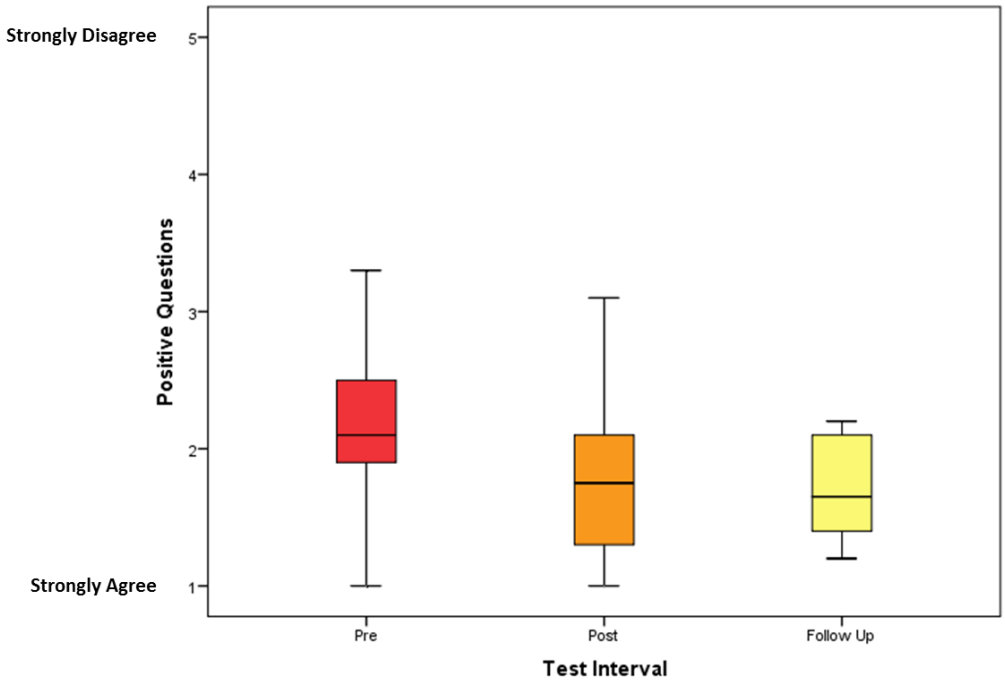

Figure 6 – The positive questionnaire responses showed a favourable pattern of change immediately after LDCAT and after a period of follow-up. Self-reported cycle awareness improves following LDCAT.

Statistically speaking…

The mean of the positive cycle awareness questions pre LDCAT (M = 2.06, SD = 0.48) are higher, or not as favourable, than the same scores given post LDCAT (M = 1.71, SD = 0.53) and after a period of follow up (M = 1.70, SD = 0.37). A one-way ANOVA showed F to be significant beyond the 1% level: $F(2,579) = 34.80$; $p < 0.01$. A medium effect size was detected (partial $\eta^2 = 0.11$).

For the negative questions, for which higher 'Strongly Disagree' scores are better, a similar finding was discovered. Prior to LDCAT training the negative cycle awareness statements scored a mean of 2.46, which is midway between the 'Neutral' and 'Agree' categories. Immediately following LDCAT training the score moved away from 'Agree' (an undesirable rating) and closer to 'Neutral' (more desirable) with a new mean of 2.88. After an approximately four month period of follow-up the mean scores decreased slightly to 2.67 but were still better than the much earlier pre-training score.

In summary, **prior to LDCAT training the participants were rather ambivalent towards statements like "If I was driving a car I would get frustrated if someone was cycling in front of me in traffic".** They were either neutral on this statement or tended to agree with it. **After LDCAT fewer participants agreed with statements like these, and while this dropped a little after a four month follow up, it was still an improvement in cycle awareness compared to the scores given before the training started**. As above, this finding is not only statistically significant, it is also a statistical 'medium effect size' and would be noticeable in real-world settings.

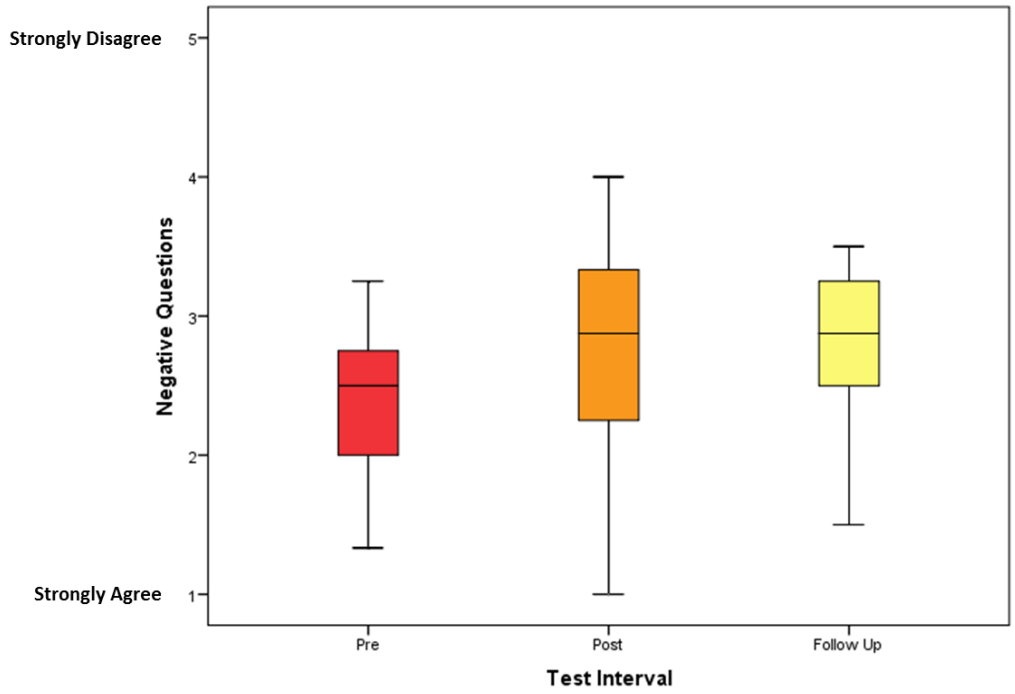

Figure 7 – The negative questionnaire responses showed a favourable pattern of change immediately after LDCAT and after a period of follow-up. Self-reported cycle awareness improves following LDCAT.

Statistically speaking…

The mean of the negative cycle awareness questions pre LDCAT (M = 2.46, SD = 0.56) are lower, or less favourable, than the same scores given post LDCAT (M = 2.88, SD = 0.80) and after a period of follow up (M = 2.67, SD = 0.79). A one-way ANOVA showed F to be significant beyond the 1% level: $F(2,584) = 26.46$; $p < 0.01$. A medium effect size was detected (partial $\eta^2 = 0.08$).

Did anything else emerge from the analysis?

The reason for a large sample size was because training evaluation studies are difficult to perform. **It is challenging to collect consistent data from participants over a four month period**, bearing in mind not all participants will complete the training, be available for follow up analysis, will experience different things in between the training and follow up, and will vary considerably in their ability to put the training to use. A large sample means the impact of all these factors can be minimised and the findings become 'generalisable' to the learner driving population at large. Having said that, a large sample does enable some interesting further analyses to be performed.

The first such analysis is to see if gender has an effect on transfer of cycle awareness training. The simple answer is, no, it does not. **No significant differences in cycle awareness were detected between genders** prior to LDCAT, post LDCAT, or during the follow up phase. The statistical effect size was also virtually non-existent. In other words, LDCAT has equal effects on both genders.

Statistically speaking…

There is no significant difference between males and females on the positive LDCAT questions, $F(1,509) = 0.03$; p = ns; partial η^2=0.00. There is also no significant interaction between genders and LDCAT measurement interval, $F(2,509) = 0.64$; p = ns; partial $\eta 2 = 0.00$. There is no significant difference between males and females on the negative LDCAT questions, $F(1,510) = 1.6$; p = ns; partial $\eta 2 = 0.00$. There is also no significant interaction between genders and LDCAT measurement interval, $F(2,510) = 0.9$; p = ns; partial $\eta 2 = 0.00$.

The second analysis looked at differences between cohorts. In the main analysis above, only participants about to undertake (or who are eligible) for learner driver instruction were analysed. This meant excluding 16 Approved Driving Instructor (ADI) participants from the analysis. The headline finding is that, unsurprisingly, there were statistically significant differences between the different cohorts, ADI's included, however, despite starting and finishing with different levels of cycle awareness all groups followed the same pattern. They all began with relatively low cycle awareness, which LDCAT improved, and that improvement was by and large maintained after follow up. There were some statistically significant (yet not very reliable) differences between some of cohorts in terms of their responses to the 'negative' questionnaire statements. Interestingly, the small group (6) of participants who undertook LDCAT at the Rcyke-a-bike centre in Stirling happened to be ex-Syrian refugees working towards a UK driving licence, and this group differed from all the others in responding extremely positively to the training. Sticking with the negative questions, it was also interesting to observe how one cohort who had been closely followed across all three phases of the study (pre LDCAT, post LDCAT, and follow up) performed. Their responses to the negative cycle awareness statements after a four month follow up period dropped back to pre-LDCAT levels. Reliable conclusions from this cannot be drawn as it is not known what experiences this cohort had between completing the LDCAT and the subsequent follow up. It does indicate that further analysis on the timing of LDCAT and any subsequent reinforcement would be very worthwhile.

Statistically speaking…

There is a main effect of cohort. The mean scores for the positive LDCAT questions differed significantly beyond the 1% level: $F(9,594) = 4.32$; $p < 0.01$. Partial $\eta^2 = 0.06$ which is a medium effect. The mean scores for the negative LDCAT questions differed significantly beyond the 1% level: $F(9,594) = 8.77$; $p < 0.01$. Partial $\eta 2 = 0.12$ which is also a medium effect. The LDCAT scores for the positive questions differed significantly beyond the 1% level across the different measurement phases of the study. The results of the ANOVA are $F(2,594) = 11.98$; $p < 0.01$. Partial $\eta 2 = 0.04$ which is a medium effect. The LDCAT scores for the negative questions differed significantly beyond the 1% level across the test intervals. The results of the ANOVA are $F(2,594) = 21.49$; $p < 0.01$. Partial $\eta 2 = 0.07$ which is also a medium effect. For the positive questions there is no statistically significant interaction between cohort and test interval ($F(12, 594) = 0.18$; p = ns; partial $\eta^2 = 0.004$). For the negative questions there is *a statistically significant interaction between cohort and test interval ($F(12, 594) = 2.13$; $p < 0.05$; partial $\eta 2 = 0.04$). The interactions refer to the follow-up condition in which the group sizes were, in some cases, very small. This renders the outcomes somewhat unreliable.*

The third analysis attempted to look at whether those who passed either their theory or practical driving test had higher or lower cycle awareness. The results are inconclusive. Despite the large sample size (381) there were no participants logged as having 'taken their test and failed'. This means a comparison group for the learner drivers (42) who had 'taken their test and passed' does not currently exist in the data set. It should be noted that 144 participants had, at the close of the study, still to take either a theory or practical driving test, and a further 173 participants had unknown driving test pass status. It would be useful to follow up on test pass status at a later point in time. The direct impact of LDCAT on being able to successfully pass a driving test could then be established.

Overall, what was found?

- **Learner Driver Cycle Awareness Training (LDCAT) works**. People who take it show statistically significant improvements in their self-reported cycle awareness after doing the training.
- Even after a long period of follow-up (approximately four months) the evidence is that **the training effect persists**. This is despite wide variations in the post-training experiences and conditions the participants would have been subject to, and which are outside the control of this study.
- Training evaluation studies are difficult to perform and sometimes reveal that training is ineffective. Set in this wider context the fact that LDCAT training *is* effective is a very positive reflection on the training intervention and methodology. **This study represents an unusually stiff test** by sampling a large number of people and, uniquely for a transport study, achieving a **balanced gender mix**.
- **Further research** can explore in more detail the optimum point in a learner driver's career to intervene with LDCAT training, when additional reinforcement would be most useful, the specifics of how increased cycle awareness translates into actual driving behaviours, and any beneficial impacts on driving test pass rates.