Problem driver remediation: a meta-analysis of the driver improvement literature

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**CRD summary**
This review assessed the effect of state driver improvement programmes on subsequent traffic violations and accidents. The authors concluded that driver improvement interventions, particularly licence suspension or revocation, reduce the risk of accidents and violations. The robustness of the conclusions are weakened by methodological and reporting limitations to the review and unexplained variability in the meta-analysis.

**Authors' objectives**
To assess the effect of state driver improvement programmes on subsequent traffic violation reduction and crash reduction.

**Searching**
The reference lists of two existing reviews were screened. Searches of two traffic safety research databases (TRIS and the California Department of Motor Vehicles research library) were conducted.

**Study selection**
**Study designs of evaluations included in the review**
Randomised controlled trials (RCTs) and studies of a design that was considered to provide reasonable comparability of the groups at baseline were eligible for inclusion.

**Specific interventions included in the review**
Studies were eligible if they compared some form of remediation programme for driver improvement with a nonremediation programme, or compared an enhanced form of remediation with a standard intervention. The included studies used a variety of types of intervention: educational or informational material, group meeting, individual meeting, licence suspension or revocation, probation under the threat of licence suspension, traffic violation point reduction and licence extension. About half of the studies used multi-component interventions. In the included studies, the interventions were most commonly triggered by traffic violations and point systems, and were the responsibility of the court or driver licensing agency. Many of the included studies were Californian post-licensing control programmes.

**Participants included in the review**
Studies of drivers selected because of poor driving ability were eligible for inclusion. Studies involving only driving-under-the-influence offenders were excluded.

**Outcomes assessed in the review**
Studies that assessed both subsequent crash rates and subsequent violation rates were eligible for inclusion.

**How were decisions on the relevance of primary studies made?**
The authors did not state how the studies were selected for the review, or how many reviewers performed the selection.

**Assessment of study quality**
Studies were assessed for study design (true versus quasi-experiment), baseline comparability of the treatment groups (classified in seven categories from best to worse), overall study quality (scored from 1 to 7 for very good to very poor), duration of post-intervention follow-up, and the type of comparison group. No details were given of the criteria used for grading baseline comparability and overall study quality. Two reviewers independently assessed validity using a coding sheet. Inter-rater reliability was tested on 3 studies.
Data extraction
Two reviewers independently extracted the data using a coding sheet. Inter-rater reliability was tested on 3 studies. Treatment effects were extracted and used to calculate a standardised effect size (ES) using Cohen’s ‘d’ statistic.

Methods of synthesis
How were the studies combined?
The studies were combined using a fixed-effect meta-analysis. Pooled ESs with 95% confidence intervals (CIs) were calculated, weighting by the inverse of the variance. The percentage change in crashes and violations was also calculated for the primary types of interventions.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the Q statistic. A subgroup analysis was used to examine the influence on the results of the following: the type and orientation of the intervention; the event triggering the intervention; the agency responsible for the intervention; year of publication; the state where the study was conducted; type of researcher; mode of publication; and study quality items.

Results of the review
Thirty-five studies with 106 separate driver improvement programmes were included (more than 1,300,000 people in the intervention groups).

In terms of study quality, the majority (92%) of studies used random or ‘close to random’ allocation to treatment groups. Most studies showed good or very good baseline comparability of the treatment groups (72%), and were rated as having very good or good validity (65%).

Driver improvement programmes were associated with a small but statistically significant reduction in crashes (d=0.030, 95% CI: 0.027, 0.034, P<0.05) and violations (d=0.061, 95% CI: 0.057, 0.064, P<0.05). Significant heterogeneity was detected for both meta-analyses (P<0.05).

Licence suspension or revocation was the most effective intervention for reducing crashes (d=0.113, 95% CI: 0.101, 0.126, P<0.05) and violations (d=0.190, 95% CI: 0.177, 0.202, P<0.05). Significant heterogeneity was detected for both meta-analyses (P<0.05).

Reductions in crashes and violations were also reported for warning letters, group meetings and individual hearings. Educational and informational material interventions were not associated with a reduction in either outcome.

Interventions associated with reductions in violations were only weakly associated with reductions in crashes (correlation, r=0.30).

Statistical heterogeneity remained even after stratification by a number of modifying factors.

The results of all subgroup analyses were reported.

Authors’ conclusions
There is general support for driver improvement interventions using warning letters, group meetings, individual hearings and, particularly, licence suspension or revocation.

CRD commentary
The review question was explicitly defined in terms of the outcomes and was broadly defined in terms of the participants, intervention and study design. The inclusion criteria for study design were non-specific and appeared open to subjective opinions. It was not possible to evaluate the comprehensiveness of the literature search given the lack of dates searched and search terms used. Methods were used to minimise errors and bias in the assessment of validity and extraction of data, but it was unclear whether similar steps were taken at the study selection stage. Validity was
assessed, but the grading of study quality appeared to be subjective for some items and the designs of the individual studies were not reported clearly. Some multiple comparison groups shared a control group but it was unclear whether there were any adjustment for statistical dependency.

The studies were pooled in a meta-analysis, but no meta-analysis graphs were presented and it was unclear if the direction of treatment effect or ESs were inconsistent among the studies. Statistical heterogeneity was found in the meta-analyses. The authors stratified studies using a number of potential confounders, but heterogeneity remained. Differences in outcomes between the studies weaken the robustness of the conclusions.

Implications of the review for practice and research
Practice: The authors stated that licence suspension should be triggered as soon as legally feasible and should be preceded by early warning letters.

Research: The authors did not state any implications for further research.

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