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Do driver training programs reduce crashes and traffic violations? — A critical examination of the literature

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ABSTRACT

This paper reviews the evaluation literature on the effectiveness of classroom and behind-the-wheel driver training. The primary focus is on North America programs as originally taught in high schools but now also by private instructors. Studies from the United Kingdom, Australia, New Zealand and Scandinavia are also included.

By far the most rigorous study to date was the experimental study in DeKalb, Georgia, U.S.A. This study used a randomized design including a control group and a very large sample size to provide reasonable statistical precision. I reexamine the DeKalb data in detail and conclude that the study did show evidence of small short-term crash and violation reductions per licensed driver. However, when the accelerated licensure caused by the training is allowed to influence the crash and violation counts, there is evidence of a net increase in crashes.

The other studies reviewed present a mixed picture but the better designed quasi-experimental evaluations usually showed no effects on crash rates but almost all suffer from inadequate sample size. I show that as many as 35,000 drivers would be required in a two group design to reliably detect a 10% reduction in crash rates.

The advent of GDL laws in North America and other countries has largely remedied the concern over accelerated licensure of high risk teenage drivers by delaying the progress to full licensure. Conventional driver training programs in the U.S. (30 h classroom and 6 h on-the-road) probably reduce per licensed driver crash rates by as little as 5% over the first 6–12 months of driving. The possibility of an effect closer to 0 cannot be dismissed.

Some GDLs contain an incentive for applicants to complete an advanced driver training program in return for shortening the provisional period of the GDL. The results of Canadian studies indicate that any effects of the driver training component are not sufficient to offset the increase in accidents due to increased exposure.

There is no evidence or reason to believe that merely lengthening the number of hours on the road will increase effectiveness. Programs directed toward attitude change and risk taking better address the underlying cause of the elevated crash risk of young drivers but these behaviors are notoriously resistant to modification in young people.

1. Introduction

Many years ago most would have accepted as axiomatic the premise that pre-license driver training leads to increased driving skill and fewer crashes. This assumption, in fact, led to the creation of the professional driving school industry in the United States during the 1930s. Driver-training (classroom and on-the-road) ultimately became inculcated into the curriculum of many high schools and by 1960, many U.S. states required teenage drivers to complete a certified classroom and behind the-school program before receiving their original driver's license. The required training usually consisted of 30 h of classroom education and 6 h of on-the-road instruction (1). During this period, a number of rather extravagant claims were made by the driver training industry, sometimes in concert with insurance companies, claiming that driver training programs produced large reductions in young driver crash rates. Some insurance companies offered discounts to teenage drivers who had completed driver training (2–4).

A casual inspection of the data and the studies cited to support these effectiveness claims indicated them to be void of any validity. In all cases, enrollment was voluntary and in some cases there was additional selectivity by school personnel based on academic performance (4). Subsequent research confirmed that self-selected volunteers had much more favorable characteristics than did comparison groups of non-trained students. Thus, any differences on subsequent record were confounded by variables such as socio-economic status, gender, social adjustment, grade-point average and

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Table 1
Unadjusted crash and violation means by gender and driver training status (4).

Variable	Males			Females		
	Trained ($N=3978$)	Not trained ($N=2445$)	Sig.	Trained ($N=2858$)	Not trained ($N=1907$)	Sig.
Total crashes — 1 year	.151	.176	$P<.05$	.085	.104	$P<.05$
Fatals and injury crashes — 1-year	.044	.057	$P<.05$	.018	.035	$P<.05$
At fault crashes — 1-year	.025	.032	N.S.	.009	.022	$P<.05$
Single vehicle crashes — 1-year	.012	.012	N.S.	.003	.010	$P<.05$
Traffic citations — 1-year	.567	.819	$P<.01$	.140	.198	$P<.05$
Traffic citations — 3-years	2.11	2.70	$P<.01$	.543	.694	$P<.01$

intelligence (5–7). No attempt was made in these early studies to adjust subsequent differences in crash rates for the aforementioned biases.

Since the late 1960s, three types of research designs have been used to estimate the causal effect of driver education training on subsequent crash and traffic violation rates:

(1) Retrospective or prospective quasi-experimental designs comparing trained and untrained drivers after adjusting for pre-existing differences through matching, stratification or analysis of covariance. These designs are subject to model specification errors and confounding by omitted variables.
(2) Randomized control trials (RCT) in which assignment to trained groups or a non-trained control is random. These designs are considered the "gold standard" for establishing cause and effect relationships but are difficult to execute successfully due to logistic, ethical and legal constraints. They are also subject to experimental artifacts.
(3) Ecological designs in which the quantities are aggregate measures such as the number of drivers licensed by age, number trained and rate of crashes over periods of time in different geographical regions, such as states. These designs are often subject to serious confounding, endogeneity bias, and problems in generalizing ecological relationships to the behavior of the entities of interest — i.e., individual drivers.

This paper reexamines the key research evidence concerning the effects of driver training on per capita and per licensee crash rates and discusses how the implementation of GDL laws in many jurisdictions has altered the policy implication of past driver training evaluations.

2. An early quasi-experiment

The first quasi-experimental driver training study to formally model the non-random assignment process using multivariate methods on a large representative sample of novice drivers was the California study by Harrington (4). Harrington performed a longitudinal analysis of the first four years of driving of 13,915 novice drivers aged 16–17 at the time of initial licensing in 1963.

At the time of sample selection, driver training in California was voluntary. The unique relevance of Harrington's study was the large number of biographical, socio-economic and social-adjustment variables collected and the use of these variables in identifying differences between students volunteering for driver training and those who did not. Included in the data set were variables collected from each driver's school record, including grade-point average, citizenship ratings, truancies, I.Q., achievement test score, home status, and driver training status. Additional data were collected through a mailed questionnaire and, for a small subset, through personal interviews.

Using correlational and multiple regression techniques, Harrington first identified those variables on which the trained and non-trained group differed. For males, significant univariate differences were found on 50 variables. For females, significant differences were observed on 29 variables. A stepwise multiple regression analysis produced multiple *R*s of .42 for males and .35 for females in differentiating the trained group from the non-trained group. The untrained group had significantly poorer scores on the stronger crash predictors (e.g., grade-point average, citizenship ratings, school-attendance and achievement tests) in a direction that was associated with increased crash and traffic violation rates.

Summarized in Tables 1 and 2 are driver record comparisons (mean frequency) on the key dependent variables prior and subsequent to analysis of covariance adjustment.

The results and implications of these results are clear. Prior to adjustment for self-selection volunteer bias, driver training appears to have had a significant beneficial effect on crashes and violations for both males and females. But after adjustment, none of the differences approached significance for males. For females, however, all of the differences except one (total crashes) still showed a significant ($P\leq.05$) or suggestive ($P\leq.10$) effect in favor of training. Thus, there was clear evidence of a training × gender interaction in which training effects were moderated by gender.

It is reasonable to question how these results generalize to the present given the age of the study even if one accepts the interaction effect as representing a causal effect of training. There have been major changes in the role of gender in driving and crash involvement over the past 40 years. This could explain why the gender × training interaction did not replicate in a later experimentally controlled study by Stock et al. (8).

Table 2
Bias-adjusted crash and violation means by gender and driver training status (4).

Variable	Males			Females		
	Trained ($N=3978$)	Not trained ($N=2445$)	Sig.	Trained ($N=2858$)	Not trained ($N=1907$)	Sig.
Total crashes — 1 year	.162	.158	N.S.	.092	.095	N.S.
Fatals and injury crashes — 1-year	.050	.048	N.S.	.021	.032	$P<.05$
At fault crashes — 1-year	.027	.027	N.S.	.010	.020	$P<.05$
Single vehicle crashes — 1-year	.013	.011	N.S.	.004	.010	$P<.05$
Traffic citations — 1-year	.654	.673	N.S.	.154	.176	$P<.10$
Traffic citations — 3-years	2.32	2.31	N.S.	.583	.634	$P<.10$