

The Chronicle of the American Driver and Traffic Safety Education Association

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 The Chronicle of the American Driver and Traffic Safety Education Association is published quarterly in cooperation with the Indiana University of Pennsylvania Highway Safety Center.

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Publishing Information

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The Chronicle Editorial Deadlines

Winter '03 Issue	Dec. 1, 2002
Spring '03 Issue	Mar. 1, 2003
Summer '03 Issue	June 1, 2003
Fall '03 Issue	Sept. 1, 2003

Publication Guidelines

Articles submitted for The Chronicle are subject to peer review and should conform to the American Psychological Association style. The basic reference for style is 1983 Publication Manual of the American Psychological Association (3rd ed.). Authors are responsible for adherence to style. Two copies of typed manuscript or a Word for Mac 6.0 file are required for peer review. Articles may be reprinted with credits to the author and The Chronicle of ADTSEA.

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Printing Information

This publication is prepared using PageMaker 6.5.2 and printed by Speedy Print, Waite Park, MN.

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Last Year and This Year

As we enter a new year, what has happened in driver education and what can happen? Several states have taken a look at their driver education program and decided to take steps to improve it.

Oregon continues to make major strides by putting in place improved driver education teacher preparation and adding additional staff at the state level to support the program. Ohio held its first driver education conference in many years with nearly 300 people attending. Vermont and Virginia have new driver education curricula. Texas continues to revise its new curriculum. Michigan has improved its teacher preparation efforts by adopting the ADTSEA model and delivering it through MDTSEA. The Florida legislature has adopted a new law allowing counties to initiate a \$3.00 fee to support driver education financially. Idaho held its first national traffic safety conference and is working on developing a new curriculum. North Carolina is re-examining its driver education program, hopefully with soon-to-be positive improvements. Another southern state is examining its program for possible improvements. And there may be others making improvements.

But that was last year . . . and this is this year. Where do we go from here? First, we (ADTSEA) continue to help those states improve their programs. Second, we (ADTSEA) generate interest in other states to improve (teacher preparation and curriculum development/revision) their program. Third, we (NSSP) increase student activities in traffic safety across the country. Fourth, we (ADTSEA/NSSP) continue to be the professional resource that the country looks to for driver education expertise and leadership. Our members provide us with the credibility that agencies look for when they need help. Agencies turn to ADTSEA for the guidance, the planning and the implementation strategies that have made a name for this association for so long.

This year, look for change. Look for a push to ensure that we in our local programs are teaching the new content we should be. Look for more states to examine their programs and call upon ADTSEA for help. Look for, and be part of the improvements that will make driver education a key player in the total highway safety plan for states and the nation.

The Editor's Point of View

This issue of the *Chronicle* along with information included in the enclosed *News and Views* provides a snapshot and retrospective of the ongoing struggle within the safety, health, and public policy communities concerning the role of formal driver education. This issue has been debated well over three quarters of a century. Some engaged in the debate believe that teaching people to drive exposes the person to unnecessary risk of injury and death. These people focus on delaying learning how to drive as long as possible and then restricting the new driver's driving as much as possible.

Under the heading of "Graduated Driver Licensing" it has been demonstrated that delaying driver licensing

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Dr. "Brad" Bradshaw

Got Any Change?

Greetings Y'all, So far it has been an interesting winter. Our weather tendencies seem to be changing. The weatherman started predicting the "S" and "I" words (Snow and Ice) the first week in December this year. That is just not Georgia weather! Of course I could be on the golf course the next week.

Another change of note in Georgia is the election of the first republican governor in over 100 years. As driver educators we must be keenly aware of our political climate. We have another opportunity to make a case for quality driver education.

Effective July 1, 2002 the new Department of Motor Vehicle Safety (DMVS) became responsible for overseeing all driver education in Georgia. We have all heard "Hi, I'm from the government and I'm here to help." Well, in this case it appears to be true.

The Georgia DMVS is working with driver educators from public schools and the private sector to "Raise the bar for driver education in Georgia" As an ADTSEA member, from an affiliated state, I was able to contact Dr. Bradshaw at the ADTSEA office for support and guidance. Arranging for Dr. Bradshaw to meet with our DMVS was extremely helpful.

Across the nation you have shared your similar changes and opportunities with me. ADTSEA is a marvelous vehicle for sharing and learning from each other. Do not forget that ADTSEA is here to help.

I look forward to hearing of your "changes" when we visit at the ADTSEA conference in Charlotte, North Carolina this summer. That is, if I do not see you at a state or regional conference before then. Past President Sam Houston and her division chairs along with the executive committee have been hard at work to develop an exciting program for Charlotte. Do not miss it.

As for right now, I need to put another log on the fire. It has been an interesting winter. Keep up the good work!

and restricting mobility choices can prevent injury and death among novice drivers. By increasing the time it takes to become fully licensed and then by restricting driving to lower risk conditions injuries and deaths have been prevented. This same finding was demonstrated in an earlier era when states began to mandate driver education program (which had the effect of delaying licensure) prior to licensing and when states adopted probationary status for young novice drivers and implemented systems of close supervision of these new drivers.

People who do not drive are not drivers in injury and fatal automobile crashes. But people drive because they want or need to travel for business and pleasure. For the foreseeable future the preferred means of travel is private passenger vehicles. We can debate for another three quarters of a century or we can come together to fully integrate driver education into the process of licensing drivers right now.

The science of teaching and learning give clear direction on how to maximize learning (see Waller p. 8) and the lengthening of time required to get a driver's license provides the opportunity to follow that informed direction.

If we hope to make progress in improving mobility and safety for beginning drivers during the next 75 years the safety, education, health, and public policy communities need to come together and stop bickering. These communities working together can create a synergy which will make the whole greater than its parts.



Kal Kelliher

The safety value of driver education and training

D R Mayhew, H M Simpson (Traffic Injury Research Foundation), Ottawa, Ontario, Canada

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New drivers, especially young ones, have extremely high crash rates. For example, Williams' reported that in 1995 in the United States, 16 year old drivers were involved in 35 crashes per million miles of travel, compared to drivers in their 20s and early 40s who were involved in nine and four crashes, respectively, per million miles. A major reason that young drivers are over represented in road crashes is because they are inexperienced, lacking the necessary driving skills and capabilities.' This is not surprising because driving is a complex, self paced activity involving a myriad of basic tasks (for example, steering, braking) and higher order skills (for example, hazard perception, problem solving), many of which are essential to safe vehicle operation.'³

A prevalent response to address the complexities inherent in driving has been to ensure that the needed skills and capabilities are provided before full licensing is permitted. This is usually done either less formally under supervision of a parent or other adult licensed driver, or formally under professional in-class and in-vehicle instruction, or both. There has always been considerable expectation for the value of formal education and training. Indeed, such programs are generally accepted as an efficient and effective means for learning to drive and for preparing to take the road test, which sets the minimum driving standards in a jurisdiction.

Teaching the skills needed to pass the road test, however, is not the only, or most important, stated objective of driver education and training programs. The principal goal of many, if not most, driver education and training programs is to produce "safer" drivers, defined in terms of collision involvement. Simply put, it is assumed that drivers exposed to formal instruction should have lower crash rates than those who do not receive such instruction, that is, those who learn to drive informally. Despite the belief in the safety value of driver education, programs have not proven effective. As counterintuitive as this may seem, empirical evidence supporting the safety benefits of formal driver education/ training is lacking. Numerous studies have failed to show any positive effects and some even suggest that such programs pose a

safety risk because they lead to earlier licensure.

Concern about the problem of young driver crashes, and a growing recognition of the failure of formal driver instruction to resolve it, has led in three inter-related directions. First, new licensing approaches to reducing the crash risk of young novice drivers have been sought and, in North America, this has resulted in the development of a system called graduated driver licensing (see Williams and Ferguson, and McKnight and Peck in *Injury Prevention* 2002;8(Suppl11)). Second, the recent adoption of graduated licensing has also resulted in heightened interest in improving the delivery and content of driver education and training programs. Third, these recent developments have also led to interest in parent supervised practice as a means to increase overall practice and accelerate skill development (see Simons-Morton and Hartos in *Injury Prevention* 2002;8(Suppl11)).

In this paper, we will review the empirical evidence on the safety effectiveness of driver education and training, consider the reasons why the research has not been able to identify consistent and long term safety benefits of such programs, and discuss improvements in driver education/ training that may produce safety benefits.

SAFETY EFFECTIVENESS

In 1996, the current authors produced a report that provided a contemporary review of the value of driver education/ training, particularly in relation to new licensing systems, such as graduated ones.⁴ It reviewed 30 studies from several countries that examined the effectiveness of formal driver education/training, motorcycle rider education/training programs, and advanced training courses for novice drivers. That review of scientific evaluations provided little support for the claim that driver instruction is an effective countermeasure. The preponderance of evidence failed to show that formally trained students have a lower frequency of crashes than those who do not receive such training. Even more discouraging, a few studies even showed a safety disbenefit—that is, an increase, rather than a decrease, in

crash involvement. In some cases, this occurred because driver education resulted in earlier licensure, and consequently, more crashes. On balance, the weight of the evidence did not favor the hypothesis that formal instruction provides safety benefits.

Since the publication of our report, there have been four major, independent, reviews of evaluation research on the safety benefits/ disbenefits of driver education and training. These contemporary reviews reached the same conclusions as we did in our earlier report. For example, researchers at the John Hopkins School of Public Health recently reviewed nine studies that met their quality criteria' and concluded that:

"There is no convincing evidence that high school driver education reduces motor vehicle crash involvement rates for young drivers, either at the individual or community level. In fact, by providing an opportunity for early licensure, there is evidence that these courses are associated with higher crash involvement for young drivers" (p. 40)

Two reviews on the effectiveness of driver education/ training have also recently been published in Australia. Woolley,⁶ in a study for Transport South Australia, reviewed the international literature on the effectiveness of in-car training in high schools and concluded that:

"Very little new evidence has emerged to support driver education and training in high schools and the bulk of the scientific literature is damning of the ability of high school driver education and training to deliver net road safety benefits. Such education generally leads to increased licensure rates and younger driver ages, causing problems which far outweigh any benefits achieved" (p. ii)

Christie,⁷ in another Australian study, examined the international literature on the effectiveness of driver training as a road safety measure. His focus was broader than both the Vernick *et al* study and the Woolley study on high school based driver education/ training programs in that he investigated the safety value of such programs for three distinct groups: learner permit drivers; young/ recently licensed drivers; and experienced drivers. His comprehensive review

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suggested that for learner drivers:

"Pre-license driver training/education contributes little to post-license reductions in casualty crashes or traffic violation ...In addition, mandatory pre-license training or even formal pre-license training/education, such as high school driver education programs in the USA, may contribute to increased exposure-to-risk for young drivers, particularly females, by encouraging early solo licensing. There is also considerable evidence that driver training that attempts to impart advanced skills such as skid control to learner drivers may contribute to increased crash risk, particularly among young males" (p. iv)

His review of the evaluation studies of post-licensing training programs for novice drivers also resulted in a similar conclusion: "there is no clear evidence that post-license training for novice drivers leads to reductions in crash or violation involvement" (p. v). Moreover, he found no "sound evidence that either advanced or defensive driving courses reduce the accident involvement of experienced drivers who attend them" (p. v).

A review of the safety effectiveness of school based driver education, by the Cochrane Injuries Group in the United Kingdom, reported similar conclusions. Roberts and Kwan⁸ observed the following:

"The results show that driver education leads to early licensing. They provide no evidence that driver education reduces road crash involvement, and suggest that it may lead to a modest but potentially important increase in the proportion of teenagers involved in traffic crashes" (p.1)

In summary, our 1996 review, and several more recent ones, provide little support for the hypothesis that driver instruction is an effective safety countermeasure. There is no clear and convincing evidence that driver education/training, particularly the traditional formula, which is 30 hours in-class education and six hours in-vehicle instruction, impacts safe driving and reduces the elevated crash risk of young novice drivers.

FORMAL INSTRUCTION FAILS TO REDUCE CRASHES

A critical issue is whether formal driver instruction can have the potential to produce bottom line safety benefits. The answer to this question is speculative, but some insights can be

gained through a consideration of why such programs have not been effective.

Driver education/training fails to teach the knowledge and skills critical for safe driving

As observed by Simpson,⁹ there is general agreement that to achieve its loss reduction potential driver education/training should focus on those aspects of the driving task that are linked to the risk of collision. However, definitive research on the critical age and experience related factors that render young drivers at increased risk of collision has been slow to accumulate, so the empirical basis for curriculum development has been limited. Nonetheless, there is an existing pool of knowledge that can and should be used as the basis for developing training/education programs.²

Many, if not most, existing driver education courses actually do cover at least some of the psychomotor, perceptual and cognitive skills that have been shown to place young drivers at increased risk of collision. The problem is that they are usually covered in a relatively superficial manner, owing to the scope of topics being presented and the limited time frame available. Most programs typically involve 30 hours in-class education and six hours in-vehicle training. The effectiveness of courses might be improved through a more judicious selection of content, with emphasis being placed on those skills that have been shown to be related to collision involvement, such as hazard recognition and risk assessment.^{2,4}

The safety impact of driver instruction might also be improved if it emphasized not only learning of key skills and capabilities, but also their acquisition in situations that are most relevant, such as in situations where young drivers are at high risk. In this context, the driving conditions in which young drivers have been shown to be over represented, or at high risk, should be the primary focus. Of course, the challenge is to design such learning experiences, either real or simulated, that do not place the novice or the instructor in situations that can have negative consequences.

The impact of improved skills training, however, will likely not reach its potential unless driver education/training also effectively addresses the age related factors that contribute to the higher crash risk of young drivers. Young novices have a greater likelihood of being involved in a collision because risky behaviors and attitudes are so prevalent among adolescents. And regardless of their skill level young people are relatively immature and

unmotivated to drive safely. Indeed, their primary motivation is simply to obtain a driver's license.^{2,9}

Driver education does teach safety skills but students are not motivated to use them

Perhaps forces and conditions beyond the control of the driver education environment mitigate the beneficial effects of safety training. As Waller¹⁰ suggested nearly three decades ago, driver education does instill the necessary knowledge and skills; it gives students what they require in order to be safer drivers. But it cannot ensure that those skills will be put into practice; it cannot influence how students will eventually choose to drive. On the one hand, this leads to a rather pessimistic forecast for driver education. It implies that driver education will never be able to achieve the goal of reducing the collision involvement of its graduates because of the countervailing influence of factors related to how young people eventually choose to drive. On the other hand, this could be regarded as an opportunity for driver education. If it can be accepted that driver education and training is effective in teaching knowledge and skills, or that it could be structured to be effective, the challenge would be to determine how driver education could also enhance the likelihood that these capabilities will, in fact, be used.

The crucial link between motivation and the success of driver education has also been noted by McKnight.¹¹ He points out that a primary and very legitimate motivation for students in traditional driver education courses is to obtain their license. As a consequence, they learn information and skills most germane to that goal. They are not particularly motivated to learn safe driving practices, which are also not relevant to them, since they have very little driving experience at this point. For these reasons, McKnight suggested a unique and somewhat revolutionary perspective on driver education. He argued that "when" things are taught might be as important, if not more important, than "what" is taught. An optimal system would be to provide instruction in basic skills prior to licensing, with instruction in safe driving practices not being offered until after licensing. A key point here is that the experience gained in real world driving following licensing would make instruction in safe driving practices more meaningful. According to McKnight,¹² however, "the challenge that faces the traffic safety community is finding ways to provide learning

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experiences that will yield the same benefits as those gained from driving, but without the same risks" (p. 35).

Christie⁷ has also proposed a different type of training program to more effectively address factors such as attitudes and motivation that shape the driving behavior of young novices. He suggested the use of "education programs delivered over several years, perhaps through secondary schools, to foster development of safe attitudinal/motivational factors, using driver testing as motivator" (p. vii).

Driver Ed. fosters overconfidence

It has been suggested that training new drivers, particularly in emergency maneuvers and collision avoidance techniques, fosters overconfidence and thereby increases risk rather than reduces it. For example, evaluations have found that advanced training in skid control does not reduce crash involvement. One possible explanation for this finding is that situations that precipitate the need for emergency skills arise infrequently, so the requirement to deploy these skills is also infrequent. And, given that there is poor retention of skills that are used infrequently,¹³ advanced skills learned over a relatively short period of time may tend to erode and not be readily available or inappropriately applied in emergency situations one or two years later. As observed by Christie,⁷ "drivers quickly forget those behaviors, which they do not have to use regularly. This is not unique to driving, people lose competence in respect to any set of skills which are not practiced, or are engaged in only rarely" (p. vi). But perhaps of greater importance, the results of several evaluation studies show that course graduates actually have higher collision rates than individuals who did not receive such training.⁴ An explanation for these findings is that advanced skills training leads to overconfidence which may eliminate normally cautious behavior. It can also result in a greater willingness to put oneself at risk. For example, graduates of advanced skill courses will be less reluctant to drive in adverse conditions because they are confident that they can handle them.

What seems needed then is a means to provide emergency maneuver training without instilling the unwanted overconfidence. Perhaps rather than teaching emergency responses and anticipatory skills, exercises could be developed so that the perceptions of risk and the driver's limitations are stressed more than the actual training of skilled performance. Drivers in advanced

courses may need to develop insight into their own limitations. In this regard, Gregersen¹⁴ has concluded that if drivers are taught only to be skilled, they believe they can handle situations better than they really can. But if they are taught that they should not always rely on their skills and that they should be aware of their own limitations, the overestimation of abilities is considerably lower. For this reason, Gregersen believes that skill training should be complemented with, or replaced by, insight training.

Driver education fails to adequately address lifestyle issues

Recent research has shown that in addition to the set of psychomotor, perceptual, and cognitive skills, broader psychosocial characteristics are related to the collision involvement of young drivers.⁷ Psychosocial variables that describe a pattern of behavior, such as risk taking and sensation seeking, are commonly referred to as "lifestyle" and there is now considerable evidence about the strong relation between lifestyle and collisions involving young drivers.¹⁵

At issue is the extent to which short term programs, such as driver education, can influence lifestyle and those psychosocial factors that give rise to the risky driving behavior of young people. Simpson⁹ indicates that although opinion is divided, there is growing recognition in the field that modifying lifestyle problems does fall within the purview and capacity of the traffic safety system and that there is really no need to assume that addressing lifestyle variables requires the system to reach back into the developmental process. Rather, it might involve moving or compressing the natural developmental process that extends from the age of licensing into the early 20s.

There is general agreement that as part of the developmental process many young people eventually "mature out" of risky driving and that the changes in lifestyle behavior that occur over several years contribute to lower collision rates.⁹ In doubt, however, is the extent to which this process can somehow be accelerated or compressed and whether this can occur in a driver education context. Certainly, the task of shaping or modifying risky driving behaviors that reflect adolescent lifestyle is a daunting one and will require a better understanding of the developmental and psychosocial context in which such behavior takes place.

The point is that lifestyle clearly influences how the young person chooses to drive. Indeed, some authors

have suggested that these factors are so powerful they offset benefits that might arise from driver education. Figuring out how to temper the countervailing influences of lifestyle factors would be challenging, and whether this is something that might be achieved through driver education remains uncertain. There is no empirical evidence available that would settle the question and opinion remains sharply divided.

Driver education fails to tailor content to student needs

Not all young drivers are at the same levels of skill, intelligence and reasons for taking training, nor do they choose to drive the same vehicle, for example, a motorcycle versus a car. Accordingly, trainees who begin with a relatively low level of skill development could conceivably benefit from skill training. For others who are more skilled in operating the vehicle, training may only provide a means to reduce insurance premiums or to satisfy a parental demand and, as such, will likely provide few safety benefits. In this context, better information is needed from evaluation research regarding who does and does not benefit from current programs, and why. Such information would provide a basis for developing and tailoring formal education and training programs to the specific needs of the novice driver. In the interim, competency based programs that focus on evaluating student performance and recognize that students have varying levels of knowledge, skills and capabilities may have some merit.⁴

IMPROVING THE SAFETY VALUE OF DRIVER EDUCATION AND TRAINING

Based on his recent review of the evaluation literature, Christie⁷ suggested alternatives to conventional driver training, including an extended period of supervised driving and graduated driver licensing. Similar conclusions were expressed in the review of the evaluation literature by Vernick and colleagues,⁵ and Woolley,⁶ who called for "parental involvement whereby driving exposure during the critical learner driver phase is increased prior to unaccompanied driving" (p. i).

Programs such as graduated licensing that encourage greater parental involvement in supervised practice, and minimize exposure to high risk situations, should be vigorously promoted. In this regard, most jurisdictions in North America have already implemented, or will soon be

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implementing, this safety measure which has proven effective in reducing young driver crashes.¹⁶ It is also important, however, not to abandon driver education/training as some might suggest because of its poor safety record. New opportunities for driver education and training as a means for preventing collisions involving young novices need to be examined.

Linking driver education to graduated licensing

The advent of graduated licensing has actually rekindled an interest in driver education/training and the role that it might play.⁴ A key question is whether driver education/training should be linked with graduated licensing. Certainly, jurisdictions should not feel compelled to create a formal link between graduated licensing and driver education and, if they do, the training should not receive special status such as being allowed to substitute for time in the system; for example, it should not be recognized through a "time discount" because of the safety disbenefits. Efforts should be made to improve the form and content of the education/training experience. Although the benefits of any improvements have not been established, they may offer promise and can only be evaluated if implemented.

Improvements to driver education/training in a graduated licensing program should be multi-phased to harmonize with the graduated licensing process that becomes progressively less restrictive as the novice moves towards full licensure. Despite this prominent feature of graduated licensing, most systems that include driver education/training do so only as part of the learner's stage. As a consequence, driver education/training does not fit well with the multi-phased graduated licensing system. To rectify this situation, the National Highway Traffic Safety Administration (NHTSA) has recommended a two-stage driver education program: a basic driver education course in the learner stage of graduated licensing and a more advanced safety oriented course in the intermediate stage.¹⁷ A rudimentary multi-staged driver education/training and graduated licensing system is in place in Michigan.

The notion of multi-phased driver education is certainly not new. As mentioned previously, McKnight¹¹ recommended post-licensing instruction of higher order skills over 15 years ago. Furthermore, although graduated driver licensing programs do not exist in Europe, several countries

have multi-phased driver education programs. For example, in Finland, the compulsory second phase of driver training focuses on avoidance of risk situations rather than the mastery of technical skills.¹⁸ In the recent DAN report (Description and Analysis of post licensing measures for Novice drivers) Bartl¹⁹ recommends multiphase driver education similar to the Finnish model.

The American Driver and Traffic Safety Education Association (ADTSEA) has also been working closely with NHTSA to develop new curriculum standards for multi-staged driver education. Robinson²⁰ uses the term "advanced driver education" to refer to a new approach to training young drivers in a graduated licensing system. He states that "initial training of novice drivers will provide basic vehicle handling skills and the second training course will provide other safe driving skills, including enhanced decision making to reduce the risk of young drivers".

CONCLUSION

Traditional, short term, driver education/training programs of 30 hours in-class education and six hours in-vehicle instruction should move towards the multistage approach promoted by NHTSA and ADTSEA. The role that driver education/training can play in augmenting and improving parent supervised practice driving within a graduated licensing system also needs to be examined. Several states, including Hawaii, Ohio, and Texas, are revising their driver education curricula with the help of ADTSEA. However, if driver education/training is to be integrated with a graduated licensing system, the proposed program should be carefully scrutinized to determine if it addresses certain key areas:

- The program content should be empirically based and focus on those psychomotor, cognitive, and perceptual skill deficiencies that have been shown to be associated with high collision rates of novice drivers

- The curriculum should include experiences that demonstrate the value of safety practices and, thereby motivate novices to drive safely

- Training strategies should be incorporated to make novices aware of their limitations and counteract the problem of overconfidence

- Teaching methods and techniques should be developed to address lifestyle and psychosocial factors that can mitigate any beneficial effects of training and lead to risky driving behaviors

- Competency based programs that recognize individual differences and are

tailored to address the specific skill deficiencies of novices should be included.

Fortunately, there are several current initiatives in the field of driver education in North America and elsewhere that attempt to address some of these issues. These range from the development of new curriculum for use in-class and in-vehicle instruction, to CD-ROM, interactive, home-based programs. These initiatives focus not only on learners but on licensed teen drivers as well. Moreover, most of these programs recognize the importance of practice under supervision, so they encourage or require parental involvement in the learning process. The impact of these potential improvements, however, has not been established. It cannot be assumed that just because a program addresses factors that have been shown to be associated with high collision rates of novice drivers that the program will have loss reduction benefits. Nonetheless, effectiveness can only be determined if new programs are encouraged and implemented on an experimental basis.

Safety value of driver education and training

Although much may be accomplished in improving the form and content of programs through the informed use of currently available information, more research into the behaviors and crash experiences of novice drivers is needed to identify the key experience related and age related factors that render novice drivers at greater risk. The generation of such information in the future, combined with a better understanding of the safety effectiveness of recent initiatives, can continue to provide guidance to improving the delivery and content of training programs.

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Discussion of the safety value of driver education and training

Allen Robinson, Ph.D., Highway Safety Research Center,
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The stated purpose of the paper by **Mayhew and Simpson** is excellent. However, it needs to be expanded and clarified. The studies they cited are historical in nature; there is no new information. They are simply restating that driver education does not reduce fatal crashes.

However, no one countermeasure alone will reduce fatal crashes: driver licensing does not and graduated driver's licensing (GDL) requires several components before it is determined beneficial. Thus, when determining the value of driver education, we need to look at a broader view.

VALUE OF DRIVERS' EDUCATION

Driver education has many values to parents and new drivers alike beyond what safety researchers tend to evaluate. We live in a society that demands the use of automobiles for school, work, and recreation. Our economy evolves around mobility.

Therefore, the value of driver education is obtaining a driver's license, going to school, going to work, and all other uses of cars. For example, why would we have School To Work programs if the student has no way to get to work? As young drivers mature and gain experience, they are involved in vehicle crashes. This may be as much the fault of the system as it is driver education.

We have continued to evaluate driver education using official accident records to measure a reduction in fatal accidents, and researchers have had difficulty with this because sample sizes in the accident database are not large enough to draw conclusions. A reduction in non-reported crashes would have a cost benefit to society. If we broaden our evaluation to include self reported accidents, surveys, and insurance records, we can get a better picture of the value of driver education.

To only rely on official accident reports limits the ability to do a thorough analysis of driver education. When we evaluate seat belt use campaigns, it is considered successful if the use rate increases. This has been true in Pennsylvania even though the number of unbelted fatalities has increased at the same time.

IMPROVING DRIVER ED.

Improving driver education should be the goal of all who truly have an interest

in highway safety. Driver educators alone cannot improve driver education programs. The general public and highway safety professionals view driving as a simple task and have been bombarded by the publicity that driver education does not work. However, if we are going to make any effective changes everyone must stop under appreciating the driving task and the benefits of driver education. There must be a strong coalition of advocates behind changes to driver education.

Two good examples of efforts to change driver education are the two-phase driver education program being demonstrated in Michigan and the long time proposed suggestions of McKnight,¹ recommending post-licensing instruction of higher order skills. According to McKnight, post driver training should focus on avoidance of risk, decisions concerning right and wrong, and value clarification. This would also be the appropriate time to deal with all occupant protections and alcohol driving problems.

The traditional view has been that any program for young drivers must be completed by age 18. It certainly should be completed prior to full licensing, no matter what age. All involved in highway safety need to look beyond the traditional walls of what is needed to improve highway safety. This would include the age of licensing, the way people are trained, and how the public acquires the necessary training, and licensing.

AN IDEAL LICENSING SYSTEM

Rather than to continue evaluating the old forms of driver education, we need to make significant changes in driver education and driver licensing of young drivers. In an ideal GDL program, a permit to drive can be issued at age 16. This permit must be held until age 17 or a minimum of 12 months. During this 12 month permit, the new operator must: complete basic driver education; verify 50 hours of specific practice driving with an adult supervisor; and meet passenger restrictions, night driving restrictions, and zero tolerance.

At age 17 or after 12 months driving on a learners permit, most of the restrictions would be eliminated except for zero tolerance and mandatory seat belt use. During this stage of licensing and before full licensing, new drivers must be crash free, violation free (needs

definition), and complete a theory program in risk assessment, decision processing, alcohol/drug problems, and occupant protection. If they have crashes, alcohol offenses, or serious driving violations, they would be required to take a specific course related to their violation and then operate a motor vehicle properly for 12 months. After 12 months of successful driving on a restricted license and meeting all of the above, they would be issued a full license.

These are bold and probably unpopular recommendations that can only be undertaken with a broad coalition of highway safety agencies and a significant public relations campaign, followed by the development of programs to meet these needs.

CONCLUSION

Graduated driver licensing should be vigorously promoted and driver education should not be abandoned. Mayhew and Simpson state that new opportunities for driver education and training need to be examined as a means for preventing collisions involving young novices. I hope this means that a concentrated effort needs to be devoted to broadening our view on the role of driver education, improving driver education, and changing the ways we evaluate driver education.

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The Genesis of GDL

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An Origin And Destination Study, North Carolina, 1971.

The basis for originally proposing a graduated licensing system for young beginning drivers grew out of two studies conducted in North Carolina in the early 1970s. One involved linking enhanced Origin and Destination data to crash data from the same time and area, and the other linked data on passengers derived from supplemental data collected on state crash report forms. There were many limitations to these early studies, and many more comprehensive studies have since confirmed what was gleaned from these early efforts. Nevertheless, the findings of these early studies provided the basis for developing a proposal for a graduated licensing system to introduce young beginning drivers into the driving population.

In June of 1971, the North Carolina Highway Commission conducted an origin and destination (O & D) survey in the area of Marion, North Carolina. It had been determined that traffic counts at this time of year approximated the year round averages for the area. Information obtained included, among other things, number of vehicle occupants, purpose of the trip, day of week, time of day, and route designation. For a special study requested by The University of North Carolina Highway Safety Research Center, additional information was obtained on North Carolina passenger cars, including driver race, sex, and age (exact age requested if the interviewer judged the driver to be under 25; estimated age if the driver was judged to be 25 or over); the race, sex, and estimated age group of the right front seat passenger, if any, and the license plate of the vehicle. This information was collected on 1736 North Carolina passenger cars in the O & D survey.

Crash data were also obtained for the summer months for the survey county and surrounding counties. Crash data were limited to North Carolina passenger cars in crashes occurring on the same day of week and time of day during which the survey occurred. There were 1710 crashes that met these criteria. In addition, in the general area of interest, supplemental data were collected on crash reports, including age, sex, and seating position of all passengers. All together, O&D interviews came from five different stations, each one manned for 24 hours on a different weekday. No weekend

data were available. The supplemental data on passengers were collected on almost 14,000 North Carolina passenger cars.

Higher risk for young drivers. Analyses of the data showed the usual U-shaped curve, with younger and older drivers over-represented in crashes in relation to their presence on the road, with middle-aged drivers underrepresented.

Overrepresentation at night. Young drivers, primarily young males (fewer young females were licensed in 1971), were particularly over-represented in crashes between midnight and 6 am.

Effect of Passengers. Analyses of data on right front seat passengers showed that for young drivers there was a marked difference in crash risk depending on the age of the front seat passenger. Drivers under 16 represented only 0.1% of the at risk population but 4.1% of the crash population, more than a 40-fold risk. For trips in which the front seat passenger was under 21, these drivers again represented 0.1% of the at-risk drivers but 11.1% of crash drivers, more than a 100-fold difference. When the right front seat passenger was 21-44, the difference was less than 3-fold, with similar results for front seat passengers age 45 and older.

The findings from these early studies were the initial basis for proposing that the driver licensing program be used to ensure that young drivers are introduced gradually into the driving population, with certain restrictions based on their initial skill acquisition (Waller and Reinfurt, 1973). North Carolina's System Of Introducing Young Drivers Into The Driving Population.

Thirty and six. In North Carolina driver education was much the same as elsewhere, with 30 hours of classroom instruction and six hours practice behind the wheel. The actual driving practice was often less than the official six hours.

Harsher penalties for young driver infractions. Like many other states, North Carolina imposed harsher penalties on young drivers in the event of a violation, even though it was well known that these young drivers were more prone to driving errors.

Limitations on resources. Driver education instructors probably knew better than others that six hours behind the wheel was woefully inadequate preparation. Yet they also knew how limited resources were, even though at that time car dealers provided vehicles

for the driver education course. There was no way that publicly supported driver education could meaningfully increase behind-the-wheel practice. In the 1960s, Haddon (1968) defined two general goals for driver education. First, it should provide basic instruction in driving techniques, a knowledge of how to handle a car in special circumstances, and a knowledge of motor vehicle traffic laws and ordinances, and second, it should turn out a far more knowledgeable breed of citizen who will know enough about highway safety to demand and support higher (safety) standards.

Given the time and money constraints under which driver educators labor, I would argue that the course can provide basic instruction on how to handle a car, knowledge of vehicle traffic laws and ordinances, and something about safe driving practices, including the effectiveness of occupant restraints and the effects of alcohol on crash risk. Only very basic instruction can be provided in the behind-the wheel portion of driver education. Realistically, driver education in its present form and resources can do little more.

DRIVER EDUCATION IN ITS PRESENT FORM CANNOT PRODUCE A PROFICIENT DRIVER. What Is Known About Learning And How It Applies To Driving

Mass versus distributed learning. It is well established that practice that occurs over time, that is, distributed practice, results in better learning than practice that occurs all at once. Consequently, driving practice over time should be better than mass practice. Early acquisition of driving skill should occur over an extended period of time.

From simple to complex. In teaching almost any other complex psychomotor skill, instruction begins with relatively simple exercises, with task demands gradually increasing. Yet historically, in young driver preparation, we have provided only rudimentary preparation, after which young drivers were allowed into the traffic stream. Even though it was known they were more likely to make errors, we punished them more harshly when errors occurred. There is nothing in the learning literature that suggests that increasing threat helps inexperience.

All beginners are at higher risk. It is

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often suggested that limiting early driving experience "punished" the good drivers who would not have crashes. Although it is true that students with good grades are less likely to have crashes, it is also true that straight-A students who are model citizens may go out and kill themselves behind the wheel. Simply because a student has good grades and is well behaved does not mean that they can acquire a complex psychomotor skill with minimal preparation. We would not expect such students to automatically acquire athletic skill or be able to play a musical instrument because of their stellar personal attributes.

Anyone beginning to learn a complex skill, including beginning drivers of any age, will make more errors in the early stages of skill acquisition. Beginning drivers of any age go through a learning curve in which more errors are made in the early stages than later. Whether these errors translate into crashes is a function of other factors that have nothing to do with the beginning driver. For example, almost all beginning drivers at some time will run off the right side of the road and in returning to the road will overcompensate, going into the left lane or even off the left side of the road. If there is no oncoming traffic and no ditch or obstacle on the left side of the road, the driver may recover and continue driving. However, if there is oncoming traffic, or a ditch, utility pole, large rock, or sign, the driving error may turn into a crash. The outcome does not define the driver as good or bad.

ALL BEGINNING DRIVERS ARE INEXPERIENCED AND ARE MORE LIKELY TO MAKE DRIVING ERRORS.

Demonstration of skill is not a substitute for extended practice. It has been proposed that demonstration of adequate skill should be sufficient for licensure. However, it has been shown that high levels of skill do not necessarily translate into good performance on the road. On the whole, those who score best on tests of skill, for other reasons have some of the worst driving records. Ideally, all beginning drivers at any age should go through a graduated licensing system. In the US, however, it is highly unlikely that we could obtain such a system, at least any time soon. Nevertheless, because all beginners are at higher risk, it would make sense to implement licensure gradually, with extended required supervised practice and adequate performance.

Inexperience vs Deliberate Risk Taking. Although much of the problem of young drivers is attributable to

inexperience, it is also true that young drivers may be more prone to deliberate risk taking. When this occurs (e.g., driving after drinking, not using seat belts, driving at exorbitant speeds), it is entirely appropriate to invoke harsher penalties. When inexperience is combined with risk taking, crashes are more likely to occur.

Graduated licensing is not designed to address deliberate risk taking behavior. Rather, it is aimed at the inexperience component of young drivers' crash risk. However, not all risky behavior on the part of young drivers is deliberate. They may engage in high risk behavior and be completely unaware that they are doing so. Extended supervised practice should help this kind of risk taking.

Data from England (Maycock et al., 1991) indicate that delaying licensure from age 17 (the earliest licensure may occur in the UK) to age 18 results in about a 6% reduction in crash risk. However, the first year of experience results in about a 30% reduction in crash risk, independent of age. In Sweden, changes in the age at which initial supervised driving experience may occur, from age 17 -1/2 to 16, resulted in a marked increase in supervised practice and a marked decrease in crash risk (about 35%) after licensure at age 18 (Gregersen, 1997). No corresponding increase in crash risk during the practice period was observed. These studies suggest that the higher risk for young beginning drivers may be more attributable to inexperience than to age. A Proposal Based On What Is Known About Learning

Initial experience should occur under low risk conditions. Based on what is known about young driver risk, it was proposed that the initial stage of driving practice should be limited to daylight hours, with strict passenger restrictions. Because young drivers are at higher risk of crash, belt use requirements are especially important. Furthermore, because the higher crash risk does not level out until around age 25, alcohol restrictions should be extended to age 25, with zero alcohol below age 21 and no more than 0.05% BAC through age 25.

Extended supervised practice. The initial stages of driving should occur with a responsible adult in the right front seat, preferably a parent. As driving practice is acquired, the presence of the adult can be reduced, but as more complex conditions are added, the supervising adult should be included.

Gradual move to more complex conditions. As more experience is acquired at one stage, the driver should be allowed to move to more difficult driving, e.g., driving at night. However,

it is also important that there be extended time spent at each level of practice, that is, it is not sufficient to accumulate extended practice in a short period of time and then move on to the next level of licensure.

Harsher penalties for deliberate risk taking. When beginning drivers deliberately engage in dangerous driving behavior, it is entirely appropriate to punish such behavior more harshly. Examples of such behavior include very high speed, driving after drinking, and non-use of safety belts.

It takes years to become a good driver. Realistically, learning to drive requires extended practice, practice that cannot be provided at home for college or work, and the opportunity for parental supervision of driving practice is lost. Furthermore, young people want their wheels and parents are usually eager to give up chauffeuring. Lowering the age at which learning to drive is initiated (but NOT lowering the age of full licensure) means that whenever the young driver begins to drive solo, it is with more practice under his belt.

Fear of parental objections. There was concern on the part of legislators that imposing a requirement for parents to provide supervised practice would result in strong objection. Legislators are often very reluctant to place requirements on adults who may vote.

Parents are not driver educators. This point was made by legislators, although curiously it was rarely heard from driver educators. It was also occasionally heard from parents who worried about their role. There was often confusion about the primary role of the parent in the skill acquisition process. Parents do not need to be driver educators, although there remains much room for improvement in collaboration between driver education and parents. The primary role of the parent is to provide psychological control. Young drivers simply will not try things with the parent in the front seat that they may try if their passengers are fellow teenagers.

Not all young people have a parent available to provide supervision. Some legislators raised this objection, saying that it would be unfair to young people with no available parent to help. Not all parents hold a driver license, and not all households have a motor vehicle available. It is true that not all youngsters have someone who could provide supervision. However, that does not mean we should not take advantage of the parental help that is available. To help those young people without such resources, arrangements might be made through Big Brother Big

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Sister organizations or other civic groups.

Cost. Instituting any new program requires revamping current procedures, programming of data systems, developing new forms, training personnel to function under the new system, and many other costs. State legislatures are experiencing major shortfalls already, and no matter how worthy a program, if it costs money, it is likely to meet with opposition. The major problem with the cost objection is that the old system of licensing young drivers was extremely costly. The Federal Highway Administration estimates the average societal cost of a motor vehicle fatality to be around \$3 million. It could be argued that the loss of a young life may be even more costly. Even a modest reduction in teenage deaths would more than offset whatever costs may be associated with graduated licensing.

Early Efforts

Driver educators. In presentations to state and national meetings of driver educators, the response was almost unanimously positive and often enthusiastic. Driver educators are keenly aware of the unrealistic expectations that are placed on them in light of the limited time and resources available.

Toronto Blue Ribbon Panel. About 1976 I was invited to testify before a Blue Ribbon Panel of the Toronto legislature about this proposal for a graduated driver licensing system for young beginning drivers. They asked many questions, raising the points about the young driver's age, concern about imposing on parents, and the fact that parents are not driving instructors. At the end they fell one vote short of endorsing and recommending such a system.

North Carolina Legislature. Again, it was concern about lowering the age at which practice is initiated that was the major objection. However, it was possible to get the legislature to lower the age at which a driving permit may be obtained, from 15-1/2 to 15. In North Carolina driver education may be initiated at age 14-1/2, although it is often not possible to get into the courses in public school until close to age 16. Nevertheless, the lower age at which a permit may be obtained lengthens the period during which practice may occur

New Zealand. In 1984 I was invited to New Zealand to discuss several proposals for modifying the driver licensing system, including graduated licensing. Three years later they implemented the first such program in the world.

British Columbia. In 1990 I was invited to present this concept to a traffic safety meeting in British Columbia. They expressed interest, but nothing happened subsequently.

Michigan Legislature. In Michigan, as in many other states, interest in doing something about young drivers occurred when an especially horrific crash occurred near the home of a legislator, Dan Gustafson. He was very serious about doing something but was not sure what could be done. We met with him and outlined what we considered an ideal program. It included a nighttime restriction and restricting passengers to no more than one. It also included a requirement that the parent or other responsible adult certify that at least 50 hours of supervised practice had occurred, at least 10 hours of which were at night.

Mr. Gustafson succeeded in getting most of what he sought, but the nighttime restriction was shortened to midnight to 5:00 am. In addition, we lost the passenger restriction. Some of the objections were interesting and raised legitimate questions. If teenage passengers are prohibited, it could result in more teenage drivers on the road, as each took separate cars, thus increasing overall exposure to risk.

There were even more interesting questions raised in relation to passenger. Parents wanted their young driver to be able to chauffeur younger siblings to school and after school activities. Parents also said they would much prefer that their teenagers double date than single date, suggesting that eliminating the presence of the other couple might raise the risk of other kinds of "accidents." In the end, we were able to retain the requirement for parental certification of extended supervised practice, becoming the first state to do so. It is hoped that as data become available from other states with the other restrictions, it may be possible to add them in Michigan.

Why Now?

The system we have historically imposed on young beginning drivers violates almost everything we know about learning. We have given them minimal training, and then let them drive with essentially no constraints. Although we knew they were more likely to make mistakes, when they did so, they were in more trouble than the rest of us would be. There is no evidence in the literature on learning that increasing threat helps inexperience. Suppose I provide you with thirty hours of classroom instruction on the game of tennis, including the history of the game, the dimensions of the court, the various kinds of court surfaces and how to play them, the scoring rules, etc., and then

give you six hours of actual practice on a tennis court with a coach. After this minimal preparation, I tell you that tomorrow morning you are going to play a match against Pete Sampras or Vanessa Williams, and if you don't win, you will be severely punished. The threat probably will not appreciably improve your serve. Yet this is essentially the approach we have been using with young beginning drivers. We know they are at higher risk of error, and so we increase the threat of the potential consequences. In the last few years, most states have begun to implement at least some elements of a graduated licensing system. All this has occurred over a relatively short period of time. Why? It is hard to know why. Baby boomers who are now the parents of teenagers are much more aware of the risks associated with driving. Today's teenagers grew up using child safety seats and seat belts. Motor vehicle safety is a much more popular concept than it was 20 or 30 years ago. But why there was so much reluctance in the 1970s to consider seriously modifying how we taught young people to drive and why there is now so much support for a different system remains unclear to me.

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Recent Research Findings

TESTING PROTECTIVE HEADBANDS FOR CAR OCCUPANTS

An Australian Transport Safety Bureau report details the results of tests made on headbands designed to protect car occupants in a crash.
<http://www.atsb.gov.au/road/rpts/cr210/cr210.pdf>

DRIVING ON SUSPENDED LICENSES

An observational study to determine how many people get behind the wheel on a license suspended for alcohol-impaired driving has been posted on the National Highway Traffic Safety Administration's website.
http://www.nhtsa.dot.gov/people/injury/research/observation_study/index.htm

DEER WHISTLES EXAMINED

Air-fed deer whistles, small plastic devices attached to car bumpers to scare deer from roadways, are "acoustically ineffective," according to research by the University of Connecticut.
<http://www.news.uconn.edu/rel02112.htm>



SURVEYING DRIVERS WITH DISABILITIES

The Swedish National Road and Transport Research Institute has released a study examining the cars, driving habits, and safety of drivers with disabilities.

<http://www.vti.se/info/fonyhet/edetalj.asp?RecID=2135&Lang=E>

TRUCK DRIVERS IN SOUTH AFRICA TOO SLEEPY TO BE ON ROADS

A large number of truck drivers on South African roads are sleepy behind the wheel, according to a survey by Wits University's sleep laboratory.
<http://www.transport.gov.za/comm-centre/news/2002/nz1126.html>

DRIVER'S USE of SEAT BELTS INFLUENCES CHILDREN'S ACTIONS

A 2002 seat belt study conducted for the Colorado Department of Transportation found "striking" differences in car-seat and seat-belt usage rates for children riding with buckled and unbuckled drivers.

AUSTRALIAN AGENCY ANALYZES FATAL CRASHES INVOLVING DRIVER FATIGUE

Between 1990 and 1998 the proportion of fatal crashes involving driver fatigue in Australia increased from 14.9 percent in 1990 to 18.0 percent in 1994, after which there was a decline to 16.6 percent in 1998, according to a report by the Australia Transport Safety Bureau.
<http://www.atsb.gov.au/road/res-exec/or23ex.cfm>

CROSSWALK MARKINGS: HELPFUL OR HARMFUL?

"Crosswalk markings appear to be associated with increased risk of pedestrian/motor vehicle collision to older pedestrians at sites where no signal or stop sign is present to halt traffic," according to a report published in the November 6, 2002, issue of the Journal of the American Medical Association.

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