Improving the Effectiveness of Countermeasures to Prevent Motor Vehicle Crashes Among Young Drivers

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ABSTRACT

Motor vehicle crashes (MVCs) are the leading cause of injury and death among adolescents 16 to 19 years of age. Three areas of countermeasures for decreasing young driver risk are driver education, licensing policies, and parental management. Driver education is an essential part of teaching adolescents the rules of the road and operating a vehicle; however, it has not proven to prevent MVCs among young drivers. Graduated Driver Licensing (GDL) is a policy innovation accepted widely in the U. S. that delays licensure and restricts driving among novices under the most dangerous conditions. GDL programs have effectively reduced motor vehicle crashes where adopted; however, adoption and effectiveness of these policies vary. Parental management of teen driving has not been systematically studied until recently and may be an important part of reducing teen driving risk. Research indicates that parents place modest restrictions on their teens' driving and that restrictions are related to fewer risky driving behaviors, tickets, and MVCs. The Checkpoints Program aims to increase parental management of teen driving and has been shown to do so in short-term follow-ups in several randomized trials. Each countermeasure is important to teen safety and may need improvements; however, the greatest protection against MVCs among young drivers would be to provide better integration among, and wider implementation of, countermeasures.

INTRODUCTION

Motor vehicle safety has improved substantially in the past several decades with the advent of divided highways and other engineering practices; improved crash worthiness of modern vehicles; and improved passenger protective devices, including safety belts, air bags, and collapsible steering columns (Centers for Disease Control and Prevention [CDC], 1999). However, motor vehicle crashes remain the leading cause of death and injury among teenagers between the ages of 16 and 19 (National Highway Traffic Safety Administration [NHTSA], 2000). Teen crash rates are higher than those of any other age group; disproportionately high on weekends, with teen passengers, and at nighttime, and attributed to young age, lack of driving experience, and relative propensity for risky driving among young drivers (Williams & Ferguson, 2002). Countermeasures exist to combat high teen driving risk and include driver education, graduated driver licensing policy, and parental management; however, they vary in their effectiveness and implementation. Thus, the current challenges are to modify, integrate, and implement these countermeasures to make them more effective.

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The purposes of this article are to describe (1) the nature of young driver crash risk; (2) the current status of the three major countermeasures to motor vehicle crashes among young drivers, and (3) potential approaches to increasing the effectiveness of existing countermeasures.

RISK FACTORS

The identification of unique risk factors for motor vehicle crashes (MVCs) among adolescents provides the basis for counteracting them within appropriate policies and prevention programs. In their extensive review article, Williams and Ferguson (2002) delineate the following risk factors for young drivers (Table 1).

Age/Inexperience. Compared to other age groups, drivers aged 16 through 18 have the highest crash rates. Crashes are more prevalent for individuals who begin to drive at younger ages, suggesting that a combination of inexperience and immaturity contribute to the problem.

Nighttime driving. Compared to adults, adolescents actually drive less overall, but they drive disproportionately more at night and have a much higher nighttime crash rate. Nighttime driving increases both the likelihood of teens getting into an accident and the severity of the crash.

Teen passengers. The presence of other teens in the car may influence teen drivers to take risks or become distracted, and because of this, teens are more likely to crash when other teens are passengers. This risk increases as the number of passengers increases.

Alcohol. Although national rates of drinking and driving have declined significantly from the mid-1980s, it remains a problem among teenagers. Alcohol is involved in 21 percent of fatal crashes among drivers aged 15 to 20.

Safety belts. Safety belts are an effective protective device, but teenagers are less likely to use safety belts than older drivers are, which greatly increases risk of injury in a crash.

High-speed driving. Driving at high speeds increases both the complexity of the driving task and the severity of crashes. A high proportion of fatal crashes among adolescents involves speeding, particularly among males.

Table 1. Unique Risk Factors for Prevention of Motor Vehicle Crashes Among Young Drivers

Risk Factor	Description
Age	Younger age at licensure is associated with higher risk of MVC
Inexperience	A crash is most likely the first month of driving, and the crash risk the first year or two of driving is several times greater than subsequent years
Night time	Night driving is more dangerous for all drivers, but nighttime crash rates are particularly high for teen drivers
Teen passengers	The more teen passengers, the greater the risk of a crash for teen drivers
Alcohol	Alcohol is implicated in over 20% of fatal teen crashes
Safety belts	Teens are less likely than any other age group to wear safety belts
Speed	Teens drive faster than older drivers and speed is involved in a large percent of serious teen crashes

COUNTERMEASURES

The high crash rates among teens are attributable largely to their young age, lack of experience, and exposure to high-risk driving conditions (Williams & Ferguson, 2002). Because teen driving skill and sound judgment are largely products of increasing age and driving experience, improvements are dependent upon the amount they drive. However, the more teens drive, the greater their exposure and the higher their risk for MVCs (Williams & Ferguson, 2002). Therefore, programs aimed at reducing teen crash rates focus on increasing skills and minimizing driving exposure, especially in the most risky conditions, for young drivers. These goals are addressed in the three categories of countermeasures devoted to increasing the safety of young drivers: Driver Education, Graduated Driver Licensing, and Parental Management (Table 2).

DRIVER EDUCATION

By all accounts, driving is a complex task that requires a thorough understanding of the rules of the road and development of motor skills that allow one to control the vehicle. Driver education exists in some form in most states and serves the important function of providing prospective drivers with classroom instruction about the rules of the road and limited in-car training. However, most driver education programs provide only a few hours of behind the wheel training, not nearly enough to reduce the risk of teen crashes during the first months after licensure (Mayhew & Simpson, 2002). It is unlikely that any state will mandate substantially more practice driving through driver education, although some states now require substantial parent-supervised practice driving prior to licensure.

Based on information from their 1996 review of 30 studies from several countries

Table 2. Countermeasures for Reducing Motor Vehicle Crash Risk Among Young Drivers

Countermeasure	Safety Effects	Recommendations
Driver Education	Not proven to affect MVCs among young drivers	¥Two-step approach with advanced training required during the first months of licensure ¥Adapt to provisions of GDL ¥ Incorporate instruction on parental management
Graduate Driver Licensing (GDL)	Widely demonstrated to decrease MVCs among young drivers	¥ Use persuasion, social marketing, diffusion strategies to increase adoption of GDL programs ¥ Include the recommended provisions ¥ Include parental management requirements
Parental Management	Evidence that parental restrictions related to decreased MVCs among young drivers; some evidence that parental management can be increased through persuasive education.	¥ Incorporate parental management into driver education ¥ Incorporate parental management into licensing practices

along with four other more recent, major, independent reviews of evaluation research on the safety benefits/disbenefits of driver education and training, Mayhew and Simpson (2002) conclude that driver education does not seem to impact on driver safety outcomes, probably because of its short length and limited driving instruction. Moreover, there is little evidence that driver's education serves to 'weed out' less capable students, as the threshold for passing driver education appears to be relatively modest. While minimal proficiency in vehicle control is essential, it is not entirely sufficient to assure safe driving. Important skills involving perception, anticipation, and avoidance of risk develop gradually over time and many miles of driving. While driver education is an important part of the training of young drivers, it does not provide substantial safety benefits in its present form. It could, possibly, be modified and improved to better address the pressing issues of young driver safety (Robinson, 2002) [see Mayhew & Simpson (2002) for an extensive review on the current state of driver education].

GRADUATED DRIVER LICENSING

Recognition of the elevated risk of driving among teens, particularly in high-risk conditions such as at night and with teen passengers, has stimulated many states to adopt graduated driver licensing (GDL) programs (McKnight & Peck, 2002). Traditional licensing systems involved two stages. A teen could obtain a learner's permit right around his or her sixteenth birthday that allowed driving with a licensed adult. At age 16, with some variation from state to state, teens could then apply for a full license with all the privileges accorded to any driver. In contrast, GDL has three stages. Teens are able to obtain learner's permits around the same time as in traditional systems; however, the minimum period the learner's permit must be held is extended to at least several months. In some cases, minimal requirements for supervised practice driving at night and under various other driving conditions are required. GDL programs then add a middle stage in which teens obtain a provisional license that allows them to drive unsupervised under somewhat restricted conditions, often including a nighttime curfew and passenger limits. Eligibility for full licensure at age 18 depends on violation-free completion of the provisional licensing period.

After reviewing over 20 studies that assess the impact of GDL on teen crash risk in several U. S. states and other countries, McKnight & Peck indicate that adoption of GDL programs delays age at permit and provisional license, increases supervised driving, and reduces overall amount of driving, teen risky driving behaviors, crashes, and traffic violations. However, characteristics of GDL programs vary from state to state, and few jurisdictions have all the elements of an optimal program as put forth by the Insurance Institute for Highway Safety (1999). Presumably, states with more of the specified provisions would be more effective in reducing teen crashes. As an added benefit, GDL programs may enhance and support parents' efforts to moderate teen driving.

PARENTAL MANAGEMENT

With or without GDL programs, parents would seem to be in a prime position to impose and enforce driving restrictions on young drivers. Parents are involved in their teenagers' driving from the beginning, teaching them to drive, governing their access to vehicles, and setting rules. The limited research in this area indicates that parents set driving rules such as "don't drink and drive," "tell parents where you are

going and with whom," and "be home at a certain time," and that parents may delay licensure until their teens are "ready" (Hartos, Eitel, & Simons-Morton, 2001). Restrictions on teen driving are negatively associated with speeding (Beck, Shattuck, & Raleigh, 2001), risky driving, citations, and crashes (Hartos, Eitel, & Simons-Morton, 2001; Hartos, Eitel, & Simons-Morton, 2002). However, many parents are less involved with their teens driving than they could be (Beck, Hartos, & Simons-Morton, 2002). An alarming number of teens report not having driving rules or restrictions for high-risk driving conditions, including driving at night and with teen passengers (Hartos, Eitel, Haynie, & Simons-Morton, 2000; Beck et al., 2001). For example, Hartos et al. (2000) interviewed a sample of teens who reported that on average during their first month after licensure they were allowed at least some of the time to drive on high speed roads, with 2+ passengers, and in bad weather.

Surprisingly little research has focused on increasing parental management of teen driving to reduce teen driving risk. Seemingly the first research of its kind, the Checkpoints Program is designed to increase parental limits on teens' early driving, especially under high-risk conditions, through the use of persuasive communications (PCs). PCs in the forms of a video, newsletters, and a parent-teen driving agreement are designed to alter attitudes toward the risks of teen driving, perceptions about parental norms regarding restrictions, and expectations about adopting strict driving limits. The goal of the intervention is for families to adopt the driving agreement and establish and maintain driving restrictions during the first year of licensure. Pilot studies have demonstrated that exposure to the newsletters alter parental attitudes towards the risks of teen driving and the benefits of restricting teen driving. In addition, when given the driving agreement, most families reported using and liking it and adopting the Checkpoints recommendations for strict initial limits on teen driving related to driving unsupervised at night, with teen passengers, and on high-speed roads (Hartos, Nissen, & Simons-Morton, 2001). Moreover, in the first of two randomized trials, parents exposed to the Checkpoints Program materials prior to and after licensure reported significantly more restrictions on driving at licensure and three months post-licensure than did parents in the control condition (Simons-Morton, Hartos, & Leaf, 2002). In the second trial, families exposed to the materials only at the MVA at the time of teen provisional licensure reported significantly greater restrictions on teen driving one month later (Simons-Morton, Hartos, & Beck, in press; 2003).

IMPROVING THE EFFECTIVENESS OF COUNTERMEASURES

Clearly, substantial reductions in teen crash rates are most closely linked to increased adoption and improvements in GDL. Adoption of GDL tends to delay licensure and set restrictions during provisional licensure stage. A secondary effect of GDL is to alter norms regarding teen driving risk, parental management of teen driving, and teen driving behavior. While improvements in the safety effects of driver education and parenting education are possible apart from GDL, they may be more likely and successful within the context of GDL systems. A great deal more could be done to advance young driver safety through improvements in the available countermeasures, as indicated in Table 2 and discussed in the following paragraphs.

Driver Education. Driver education might be more effective as a safety program if it were organized in phases, as is currently being tried in Michigan, which would extend the period of practice driving, increase parental involvement, and could be closely linked to graduated licensing policies (Mayhew & Simpson, 2002). The first phase of driver education would occur during the learner's permit period and would focus on basic skills and rules of the road. It could also include parent education of the risks of teen driving and benefits of restrictions and even the negotiation of a parent-teen driving agreement prior to provisional licensing. The second phase would occur during the provisional or intermediate stage of graduated licensure and might include instruction on higher-order driving skills (such as risk assessment and avoidance) and extended parent involvement and supervision. Intermediate driving privileges might be linked to satisfactory completion of the advanced driver education course.

Graduated Driver Licensing. Although most states have some form of GDL, the tendency has been for states to adopt policies that are less restrictive than may be consistent with safety. Foss and Goodwin (2003) argue that GDL effectiveness is likely to be greatest when it includes strong but reasonable and acceptable protective restrictions and moderate inducements and penalties for non-compliance. While many local stakeholders have worked toward increased adoption of GDL, future efforts to obtain adoption or modification of more strict GDL programs could benefit from concerted efforts based on persuasion, social marketing, diffusion, and policy advocacy theory (Simons-Morton, Gottlieb, & Green, 1996). Recent evaluations of the effectiveness of graduated licensing (McKnight & Peck, 2002) and its popularity with parents (Waller, Olk, & Shope, 2000) could be used to persuade legislatures to adopt more strict GDL policies. Also, at present efforts to enhance the effects of GDL have been limited largely to public information campaigns. It might be possible to increase compliance with GDL policies through more substantial and targeted education and persuasion programs.

Parental Management. Programmatic efforts to increase parental management could be integrated into driver education and licensing activities to increase parental supervision of practice driving and parental management practices, including the timing of teen licensure, vehicle availability, and driving conditions. For example, at least one state, Maryland, now requires parents to provide signed statements that they have supervised their teen while driving under a variety of driving conditions prior

to licensure. Elements of the successful parent education programs, including persuasive communications and model parent-teen driving agreements, could be incorporated into driver education, during the learner stage, at licensure at local MVA offices, and even during intermediate licensure. The effectiveness of parental management programs might be enhanced if MVA staff could be involved in their delivery. Also, the effectiveness of parental management programs might be enhanced by timing their delivery and arranging the content to coincide with parental interest, for example, by targeting parental expectations during teens' practice driving, providing parent-teen driving agreements at the time of licensure, and then targeting maintenance of parental restrictions after licensure.

CONCLUSION

A great deal is now known about the unique crash risks for young drivers. Fortunately, countermeasures are available and a number of good ideas have been proposed for improving the breadth and effectiveness of these measures. Better integration and implementation of driver education, graduated driver licensing, and parent management would appear to be the most effective. We appear to be moving, albeit gradually, in that direction.

REFERENCES

Beck, K. H., Shattuck, T., & Raleigh, R. (2001). Parental predictors of teen driving risk. *American Journal of Health Behavior, 25,* 10-20.

Beck, K. H., Hartos, J. L., & Simons-Morton, B. G. (2002). Teen driving risk: The promise of parental influence and public policy. *Health Education and Behavior, 29,* 73-84.

Centers for Disease Control and Prevention. (1999). Motor vehicle safety-a 20th century public health achievement. *MMWR Morbidity and Mortality Weekly Report, 48,* 369-374.

Foss, R., & Goodwin, A. (2003). Enhancing the effectiveness of graduate driver licensing legislation. *Journal of Safety Research, 34,* 79-84.

Hartos, J. L., Eitel, P., Haynie, D. L., & Simons-Morton, B. G. (2000). Can I take the car? Relations among parenting practices and adolescent problem driving practices. *Journal of Adolescent Research, 15,* 352-367.

Hartos, J. L., Eitel P., & Simons-Morton, B. G. (2001). Do parent-imposed delayed licensure and restricted driving reduce risky driving behaviors among newly licensed teens? *Prevention Science, 2,* 111-120.

Hartos, J. L., Eitel P., & Simons-Morton, B. G. (2002). Parenting practices and adolescent risky driving: A three-month prospective study. *Health Education and Behavior, 29,* 194-206.

Hartos, J. L., Nissen, W. J., & Simons-Morton, B. G. (2001). Acceptability of the Checkpoints parent-teen driving agreement: Pilot test. *American Journal of Preventive Medicine, 21,* 1-4.

Insurance Institute for Highway Safety. (1999). Recommendations for an ideal graduated licensing law. *Status Report, 34,* p. 6.

Mayhew D. R., & Simpson, H. M. (2002). The safety value of driver education and training. *Injury Prevention, 8(supplement II),* ii3-ii7.

McKnight, A. J., & Peck, R.C. (2002). Graduated driver licensing: What works? *Injury Prevention, 8(supplement II),* ii32-ii36.

National Highway Traffic Safety Administration. (2000). Motor vehicle traffic crashes as a leading cause of death in the U.S., 1997. Springfield, VA: National Technical Information Service, U.S. Department of Transportation, Technical Report DOT HS 809066.

Robinson, A. (2002). The safety value of driver education and training: Discussion paper. *Injury Prevention, 8(supplement II),* ii7-ii8.

Simons-Morton, B. G., Gottlieb, N., & Greene, W. A. (1996). *Introduction to health education and promotion, 2nd ed.* Prospect Heights, IL: Waveland Press.

Simons-Morton, B. G., Hartos, J. L., & Beck, K. H. (in press). Increased parent limits on teen driving: Positive effects from a brief intervention administered at the MVA. *Prevention Science.*

Simons-Morton, B. G., Hartos, J. L., & Beck, K. H. (2003). The persistence of effects of a brief intervention on parental restrictions of teen driving privileges. *Injury Prevention,* 9:142-146

Simons-Morton, B. G., Hartos, J. L., & Leaf, W. A. (2002). Promoting parental management of teen driving. *Injury Prevention, 8(supplement II),* ii24-ii30.

Williams, A. F., & Ferguson, S. A. (2002). Rationale for graduated licensing and the risks it should address. *Injury Prevention, 8(supplement II),* ii9-ii14.

Waller, P.F., Olk, M.L., & Shope, J.T. (2000). Parental views of and experience with Michigan's graduate licensing program. *Journal of Safety Research, 31*(1), 9-15.