POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

American Academy of Pediatrics

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The Teen Driver

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For many teenagers, obtaining a driver's license is a rite of passage, conferring the ability to independently travel to school, work, or social events. However, immaturity, inexperience, and risky behavior put newly licensed teen drivers at risk. Motor vehicle crashes are the most common cause of mortality and injury for adolescents and young adults in developed countries. Teen drivers (15–19 years of age) have the highest rate of motor vehicle crashes among all age groups in the United States and contribute disproportionately to traffic fatalities. In addition to the deaths of teen drivers, more than half of 8- to 17-year-old children who die in car crashes are killed as passengers of drivers younger than 20 years of age. This policy statement, in which we update the previous 2006 iteration of this policy statement, is used to reflect new research on the risks faced by teen drivers and offer advice for pediatricians counseling teen drivers and their families.

BACKGROUND

The transition to independent mobility is a milestone in personal development, but learning to drive is a challenging neurocognitive task. Adolescents have many modes of transportation available to them, with differing relative costs, convenience, and safety. Options include active transport (walking, cycling), mass transit, and ride-sharing services. For many teenagers, however, driving a vehicle is a skill that enables them to work, access education, and exert their growing autonomy. Parents are often relieved when adolescents can drive themselves to activities, alleviating carpool burdens. Driving has particular significance in rural areas and regions where public transportation systems or other options are unavailable or limited.

Novice adolescent drivers (those with <18 months of driving experience) are at 4 times the overall risk of crash or near-crash events.[1] Adolescents are at risk for crashing because of their inexperience, their poorly developed skills, and for some, their engagement in risk behaviors. Age and associated neurocognitive maturity also contribute. Per mile driven, drivers 16 through 17 years of age have the highest rates of crash involvement, of injuries to themselves or others in their car, and

abstract

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of death to people outside the car in a crash.[2] For these reasons, motor vehicle crashes (MVCs) are among the most common cause of mortality and injury for adolescents and young adults in industrialized countries.[3] Adolescent drivers have the highest rate of MVCs among all age groups in the United States and contribute disproportionately to traffic fatalities. In addition to the deaths of teen drivers, more than half of 8- to 17-year-old children who die in car crashes are killed as passengers of drivers younger than 20 years of age.[4]

Nevertheless, the number of teenagers killed in MVCs has decreased by almost 50% over the last decade,[5] in parallel with overall reductions in traffic deaths. This reduction in teen traffic deaths reflects vehicle safety advances, improvements in seat belt use and impaired driving enforcement, and the impact of graduated driver's licensing (GDL) laws, which have been used to promote skills development through behind-the-wheel supervised experience and reduced exposure to risky driving situations. Although there is no national licensing standard in the United States, all 50 states and the District of Columbia have implemented GDL programs.[6]

Another reason for the reduction in motor vehicle mortality is that fewer teenagers are driving. Over the 15 years from 1996 to 2010, the proportion of US high school seniors licensed to drive declined from 85% to 73%,[7] and the proportion who reported driving did not rebound with the economic recovery.[8] Nevertheless, data from 2014 to 2016 can be used to suggest that teen motor vehicle fatalities are again on the rise.[5,9] In 2015, among 15- to 20-year-old individuals, 1886 young drivers died in MVCs, which is an increase of 9% from 2014 (see Fig 1). Another 195 000 young drivers were injured in MVCs, which is up 14% from 2014.[10]

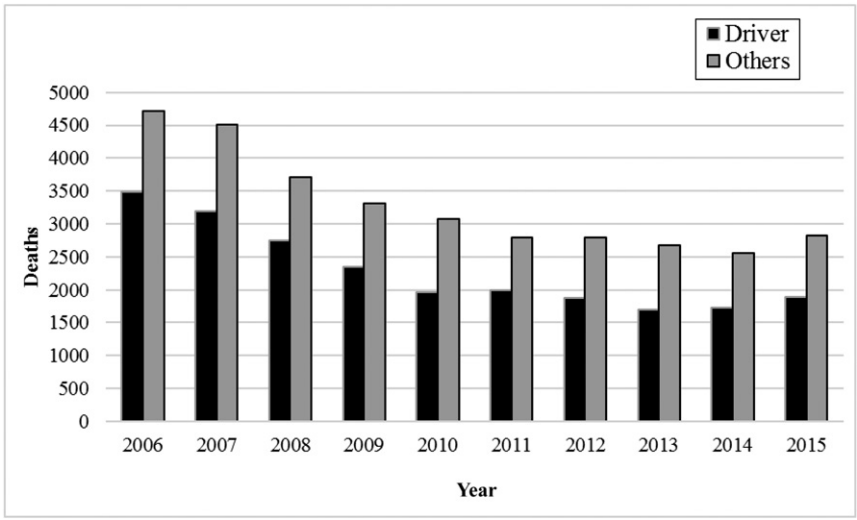

FIGURE 1

Trends in motor vehicle fatalities in crashes involving young drivers (15–20-year-olds); US data by person type ("others" are passengers of young drivers, occupants of other vehicles, and nonoccupants). (Adapted from National Highway Traffic Safety Administration; US Department of Transportation. Young drivers: 2015 data. Traffic safety facts. Report No. DOT HS 812 363. 2017. Available at: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812363. Accessed December 14, 2017.)

With this policy statement, we outline the unique risks faced by teen drivers and passengers that contribute to MVC mortality, describe promising interventions to curb this significant public health risk, and provide recommendations to guide pediatricians in counseling teenagers and families. We also describe the responsibilities of schools, community organizations, and governments in supporting programs and policies that can be used to mitigate the risks adolescents face on the road to support their development into competent and safe drivers. Other private-sector entities, such as automakers and insurers, are highly engaged in this effort, but their activities are beyond the scope of this statement. This policy statement, in which we update the previous 2006 iteration of this policy statement, is used to reflect new research on the risks faced by teen drivers and offer advice for pediatricians counseling teen drivers and their families.[11]

RISK FACTORS FOR ADOLESCENT DRIVERS

Inexperience

Driving is a complex skill, and inexperience is a common source of error. New drivers are less skilled at recognizing risks than are experienced drivers.[12] A common problem is that adolescents tend to fix their attention on nearby individual hazards rather than looking ahead and anticipating hazards. The best way for teenagers to reduce the risk of inexperience-related crash and injury is to practice driving, ideally under circumstances suited to promote learning while maintaining safety.[13]

Teen Passengers

Transporting peers can increase the crash risk for adolescent drivers.[14] Teen passengers may contribute to risk through distraction or negative peer influence on driving norms.[15] The likelihood of a teenager being involved in a fatal car crash is directly related to the number of teen passengers, an effect that is stronger in male drivers than in female

drivers.[16] Compared with adult drivers, 16-year-old solo drivers have a 2.3-fold increased risk of crash. The presence of multiple passengers can increase the risk of a crash for a variety of reasons, including driver distraction, speeding, or alcohol use.[17]

Speed and Risky Driving

For all drivers, speed is an independent risk for crashing and for death or injury in the event of a crash. Teen drivers are more likely to drive at unsafe speeds and to maintain shorter following distances, especially with young passengers in the vehicle.[18] Among fatal crashes involving 15- to 20-year-olds, speed was implicated in 36%.[19] The availability of in-vehicle cameras and data recording has allowed researchers to better measure and understand "kinematic" risky driving behaviors, defined as excessive gravitational force events (eg, stops, starts, swerving) detected by the accelerometer. On the basis of kinematic events, adolescents can be classified as having higher or lower risk driving profiles that are relatively stable, even with increased driving experience, and that are correlated with self-reported driving behaviors.[20]

Distraction

Distraction is a risk for all drivers. Distracting events can include visual distraction (having one's eyes off the road), manual distraction (removing one's hands from the vehicle controls), or cognitive distraction (having one's attention diverted from driving).[21] Electronic devices, such as cell phones, can present all 3 modes of distraction in combination and are increasingly recognized as a major threat to driver safety.[22]

In 2015, 42% of US teen drivers reported the use of e-mail or text messaging while driving in the previous month,[23] and data from 2013 revealed that 58% of teenagers 16 to 18 years of age had used cell phones while driving.[24] Researchers in cross-sectional observations estimate that at any point in time, nearly 5% of teen drivers were holding a cell phone to their ear and talking, and an additional 5% were manipulating the phone.[25] In fatal crashes, teenagers represent 7% of the drivers but comprise 10% of distracted drivers and 13% of drivers distracted by cell phones at the time of the crash.[26]

The strongest predictor of distraction-associated crash risk among novice drivers may be the duration of glances away from the road, regardless of the nature of the distracting secondary task.[27] In-vehicle recordings of teen drivers revealed that eye glances away from the road for longer than 2 seconds were associated with a 5.5-fold increased risk of a crash or near-crash event.[27]

Alcohol, Marijuana, and Medication Use

Impaired driving is a serious risk factor for MVCs, injuries, and fatalities among all age groups. Alcohol-impaired drivers of all ages were identified in 16% of fatal traffic crashes involving children younger than 14 years old, with more than half of these drivers having a blood alcohol content (BAC) greater than 0.08 g/dL.[28] Teen drivers have a higher risk of involvement in MVCs at any BAC compared with older drivers.[29]

In the United States, the National Minimum Drinking Age Act of 1984 required states to increase the minimum age for alcohol purchase to 21 years. This resulted in a downward trend in the use of alcohol by adolescent and young adult drivers. This trend has continued. According to the Youth Risk Behavior Survey of high school students, the percentage of high school drivers who drank alcohol and drove within 30 days of the survey decreased from 10.0% in 2013 to 5.5% in 2017.[23] Older students had higher rates of impaired driving relative to younger students. Over the past 16 years, among high school students, the 30-day prevalence of riding in a car with a driver who had been drinking alcohol decreased from almost 40% to 16.5%.[23]

Despite improvements, the use of alcohol by an adolescent driver remains a serious risk factor for MVC and resultant fatalities. For 2015, the National Highway Traffic Safety Administration reported that 16% of drivers 16 to 20 years of age involved in fatal MVCs had a BAC level of 0.08% or higher,[28] and 64% of teen drivers who were killed in alcohol-involved crashes were not wearing seat belts.[30]

Drug-impaired driving is a growing concern for drivers and road users of all ages. From 1999 to 2010, 24.8% of drivers in fatal crashes tested positive for drugs of abuse, and 39.7% tested positive for alcohol. In the 11 years studied, the prevalence of drugs increased from 16.6% to 28.3%, whereas the prevalence of alcohol remained stable.[31] Cannabinoids were most commonly detected, and the prevalence increased from 4.2% to 12.2% over the study period.[31] Although there is increased detection of drugs other than alcohol in drivers involved in MVCs, the specific impact of these substances on crash risk is being studied by multiple investigators. Many drugs are used with alcohol, and detection can be challenging, making acute intoxication or impairment difficult to define or to detect in a rigorous manner.[32] In a recent case-control study, crash risk was 1.21 times higher for drivers who tested positive for illegal drugs and 1.25 times higher in those who tested positive for tetrahydrocannabinol. But when analyses were adjusted for demographic variables, such as age, sex, ethnicity, and concurrent alcohol

use, the increase in crash risk was not associated solely with marijuana use.[33]

Other substances that may impair driving include prescription and over-the-counter medications. Many over-the-counter liquid medications contain alcohol or other ingredients that can cause drowsiness, including antihistamines (eg, diphenhydramine), antidiarrheals (eg, loperamide), and antiemetics.[34] For the adolescent driver, the effect of these medications on crash risk may depend on individual factors and the coingestion of other drugs or medications.

Drowsiness and Nighttime Driving

Most US teenagers do not get enough sleep[35] and, as a result, have altered circadian rhythms, which contribute to risk of fatigue.[36] Lack of sleep influences attention, learning, and judgment. Eliminating early high school start times to promote sleep is associated with reductions in teen driver crashes.[37,38] For all ages, driving at night is more dangerous than during the day, but adolescents are at particular risk during nighttime driving.[39] The independent effect of drowsiness on nighttime driving is compounded by the presence of other crash risk factors. For teenagers, nighttime driving is more likely to be "recreational" and is associated with having teen passengers, alcohol and drug use, and speeding.[40] Risk may also reflect the novice driver's inexperience with specific nighttime driving conditions.

Seat Belts

Lap and shoulder seat belts reduce the risk of death for front-seat occupants in a crash by 45% and the risk of moderate-to-critical injury by 50%.[41] Nationwide, front seat belt use for all drivers exceeded 90% in 2016 and was higher in states with primary enforcement laws (92%) than in those with only secondary enforcement laws (83%).[42] However, in 2011, only 54% of US high school students reported always wearing a seat belt, and seat belt use varied by state from 32% to 65%.[43]

Unlicensed Driving

A small but important proportion of adolescents engage in driving while unlicensed. These teenagers miss out on any type of instruction, skill validation, or graduated supervision afforded to those completing traditional driver's education and licensure. By 1 estimate, although 6% of 9th through 11th grade students had engaged in unlicensed driving, 18% of 14- to 18-year-olds involved in fatal crashes were unlicensed.[44]

Biological Risk

The human brain does not achieve complete development until after adolescence.[45,46] Puberty is a time of physical growth and sexual maturation accompanied by development and change in the adolescent brain, particularly the regions that control behavior, emotions, decision-making, and self-regulation.[47] Adolescent cognitive immaturity, including deficits in self-control, attention, and executive function, may also contribute to teen driving behaviors but have not been independently associated with crash risk.[47] Many behaviors and motivations related to driving, such as risk and sensation seeking, are neurobiological in origin, are less related to age than to stage of puberty,[48,49] and are exacerbated when coupled with normative psychosocial changes of adolescence related to limit testing. Developmental demands present unique challenges for novice drivers, as they master skills that require knowledge, experience, and judgment at a time when risk-taking behaviors and the influence of peer pressure are at their peak.[50]

Other Medical Concerns

Adolescents with attention-deficit/hyperactivity disorder (ADHD) are at higher risk for MVCs and injury. Teen drivers with ADHD experience a risk of crash 36% higher than their peers,[51] a risk that does not vary by sex, by age, or over time. Drivers with ADHD may be less attentive to driving tasks at baseline and at least as susceptible to distraction caused by technology, passengers, and external factors.[52,53] The benefit of medication is uncertain. Although data for teenagers are inconsistent, adults with ADHD for whom medication was prescribed in a given month experienced a 40% reduction in emergency visits for injuries sustained in MVCs, compared with months when they did not receive ADHD medication.[54] However, medication effectiveness varies over the course of the day, and even if treated, adolescents may be functionally unmedicated in the late afternoon or night, which are times of the highest risk of crash. Moreover, adherence can be challenging, and many teenagers with ADHD are not treated with medication. In a recent cohort, only 12% of adolescents with ADHD were prescribed medication in the 30 days before licensure.[51]

In 2009, sport-related concussions were diagnosed in almost 250 000 teenagers,[55] a number generally thought to be an underestimate. Acute concussion symptoms are associated with impairments in standard driving performance,[56] and data from adult studies suggest that these impairments may persist after the resolution of other concussive symptoms.[57] More research is needed to assist families and physicians with the decision to allow a teenager to return to driving after having a concussion.

Additional medical concerns may affect driving ability and outcome. These include conditions for which the risk is well recognized, such as epilepsy,[58] but also sleep apnea,

diabetes mellitus, depression, autism spectrum disorders, and other developmental disabilities that might require special training, assessment, or accommodation before a young person begins to drive.[59–61] Only a few states, however, require a physician visit or any form of physical health assessment (aside from visual acuity testing) before initial or subsequent noncommercial driver's licensing. Prelicensing medical evaluations for teen drivers have not been studied, although there is evidence in older drivers that even a simple statement of physician concern related to driving safety has a measurable and sustained effect on subsequent crash risk.[62]

INTERVENTIONS

Any policy, program, or design enhancement used to improve the safety of all drivers provides the greatest benefits to drivers at greatest risk, such as novice young drivers. Therefore, improved road designs, signage, separation of vehicles, and removal of objects near roadways provide great safety advantages to those who are most likely to crash. Similarly, policies regarding seat belt use and impaired driving or programs used to discourage cell phone use or aggressive driving behavior may be particularly important for young drivers. Given their high risk, young age, and inexperience, special policies and programs for young drivers are needed.

GDL

Perhaps the most important advance in teen driver safety over the last 25 years has been the development and implementation of GDL used to improve teen driving safety. Now present in all 50 states, GDL is a set of policies or regulations enacted variably at the state level and designed to introduce driving in a staged manner of increasing risk and responsibility.[63] Recognizing that driving is a skill that benefits from supervised practice and a stepwise increase in exposure and that certain driving exposures, such as driving at night, are more dangerous than other exposures, most GDL plans include a period of monitored driving before licensure, a term of probationary driving or intermediate licensure (in which certain high-risk situations, like night driving or driving with peers in the vehicle, are limited), and progression to full licensure that is contingent on performance during the probationary period.[63]

Studies of the effectiveness of GDL are encouraging. The strongest effect is observed with reduction in crashes among 16-year-old novice drivers, with a smaller effect for 17-year-old drivers.[64] In some states, a 25% or greater reduction in crashes among novice teen drivers has been reported.[65–67] GDL may reduce risk by reducing exposure if teenagers postpone licensing or drive fewer miles under GDL provisions.[68,69] Population-based data have revealed an association between GDL (for novice drivers <18 years old) and increased risk of crashing and fatal crashes among 18-year-old drivers.[67] It is unclear whether the involved 18-year-olds were novice drivers who postponed licensure or drivers who matured under GDL but with limited independent experience. Nevertheless, it suggests that GDL might be productively extended to 18- to 19-year-old novice drivers.[70] Indeed, some states now extend GDL to include novice drivers younger than 20 years old, but data are limited on the effectiveness, acceptability, and feasibility of extended GDL programs.[71]

The aspects of GDL responsible for its safety benefit are not firmly established. The provisions of GDL laws most strongly associated with lowering teen fatal crash rates are (1) strong nighttime driving restrictions, (2) restriction on teen passengers, and (3) increases in the minimum age at which a learner's permit or license can be obtained.[72] Enforcement of these selective licensing restrictions is difficult. However, New Jersey has required the use of decals on vehicles to identify novice drivers under its GDL program. Implementation of these decals was associated with a significant increase in citations to teen drivers for the violation of GDL provisions, including for the use of wireless technology,[73] and a sustained 2-year decrease of 9.5% in MVCs among young intermediate-licensed drivers.[74]

Driver Education

Formal driver education is a curriculum of didactic and basic in-car instruction designed to prepare students for a licensing examination. States vary in their requirement for formal driver's education before licensure. Driver training, by contrast, refers to behind-the-wheel instruction for novice or more experienced drivers and is often focused on specific skills.[75] Although driver education increases the proportion of students who can pass a licensing examination, there is little evidence that the program produces safer drivers, as measured by their risk of citations, crashes, injuries, or death. Studies consistently reveal no safety effect (or, in some cases, reveal an increase in risk) associated with traditional driver education.[76–80]

These counterintuitive findings that driver education may not be effective have been examined in detail elsewhere.[75,80,81] The most likely explanation of these findings is that driver education is focused on learning the rules of the road and basic vehicle handling. Unfortunately, the knowledge required to pass licensing examinations is seldom related to an evidence-based understanding of the behaviors and skills associated with novice driver crash risk.[75,81,82] Although some

newer driver training programs have shown promise in improving hazard anticipation, hazard mitigation, and maintenance of attention,[83,84] there is still little evidence that these programs translate to safety in real-world settings or that they can be effectively scaled into a driver education curriculum.[85,86] In the meantime, harm can result if completion of training allows exposure to driving or release from GDL restrictions at a younger age or with less formal experience.[80]

Parent Interventions

Parents wield considerable ability to influence teen driving exposure, behavior, and risk. Parents can set positive examples well before children begin to drive by discussing expectations and parental roles as teenagers move into driver training and by monitoring and enforcing those expectations during the supervised driving phase. Parental monitoring and guidance are associated with a reduction in traffic violations and crash rates,[87–90] and teenagers whose parents have an authoritative parenting style, have high standards, but are supportive and instructive are less likely to drink or use cell phones while driving and experience fewer crashes.[91] There is, however, substantial variation in parental involvement and little empirical evidence on how best to influence parents to provide optimal monitoring.[92] A number of formal programs built around parent–teen driving agreements (or contracts) are aimed to encourage parents to honor and support GDL policies, monitor the early driving experience, and generally treat driving as the dangerous activity it is, requiring parents to manage their children's exposure and performance. Authors of a recent review of parent-directed teen driving interventions suggest that passive dissemination of program materials is ineffective.[93] However, more intensive programs, including active parental engagement or the use of in-vehicle data recorders, reveal modest beneficial effects in the quality of risk-related communication, parental supervision in early driving, and reductions in self-reported teen risky driving.[93,94]

Winston et al[95] have called for a "precision prevention" approach to teen driving safety. In this tiered approach, a robust universal prevention strategy (eg, GDL) is paired with tools and support for parents to optimize the effect of GDL on their teen driver. For example, the Checkpoints program, which uses a parent–teen driving agreement used to assist parents in monitoring teen driving, has been used to bolster parental restrictions on teen driving behavior and reduced risky driving.[87] Similarly, a randomized trial of the Teen Driving Plan, which was used to address the quality and variety of parent-supervised teen driving, suggested that the program improved the supervised practice and the driving performance of prelicensed teen drivers.[96] The Centers for Disease Control and Prevention maintains a useful Web page for parents of teen drivers that includes a sample parent–teen driving agreement (see Resources).

Beyond universal interventions, selected interventions for subgroups of teenagers at predictably higher driving risk may be required.[95] For example, teenagers with ADHD might benefit from additional behind-the-wheel training, longer periods of restriction or supervision, and medication optimization. Most of these interventions call for increased parental involvement. Family-focused interventions for these young drivers seek to improve parental communication and monitoring.[97]

Winston et al[95] noted that some adolescents will require individualized interventions on the basis of their personal history of risk taking or demonstrated difficulties in driving tasks. These drivers might benefit from in-vehicle technological monitoring, coupled with interventions used to strengthen parental monitoring. In-vehicle data recorders can be triggered by sudden changes in speed or erratic driving. Feedback provided to teenagers and parents has been associated with a reduction in risky driving behaviors.[98,99] Parental involvement is important; however, as revealed in many studies, it is difficult to secure.

Seat Belt Laws

All states have enacted laws that require teen drivers and vehicle occupants to use seat belts. The efficacy of these laws depends on the type of enforcement and the existence of exemptions (such as for back seat passengers); there is considerable room for improvement to save lives and prevent injury. As of May 2018, 34 states and the District of Columbia have a primary enforcement seat belt law, meaning that law enforcement officials may stop and ticket a passenger or driver solely for not wearing a seat belt, independent of any other violation.[100] Secondary enforcement seat belt laws allow law enforcement to give a ticket for not wearing a seat belt only if another violation has occurred. Seat belt use is consistently higher in primary enforcement states. Episodic, intensive enforcement campaigns have also been associated with an increase in seat belt use by up to 25% and a reduction in fatalities between 7% and 15%. For details about current specific state laws, refer to the resources at the end of this statement.

Alcohol and Drug Laws

Minimum legal drinking age laws played a role in decreasing the incidence of teen involvement in fatal crashes when they were instituted in the 1980s.[101] In addition, all states have passed "zero tolerance" laws designating a BAC of 0.02% or more for young drivers as indicative of driving under the influence of

alcohol. Offenders face automatic or administrative suspension or revocation of their license. These laws have also decreased the incidence of fatal crashes.[101]

A number of states have legalized cannabis for medical use, decriminalized possession, and legalized recreational use. Although every state has laws regarding impaired driving, there remains significant variability in substance and enforcement of the laws. As of 2017, 16 states have zero tolerance laws for the use of 1 or more drugs while driving, and 6 states have "per se" laws that specify limits that cannot be exceeded for 1 or more drugs.[102]

Efforts to increase the knowledge of teenagers and parents about the potential effect of marijuana and illicit drugs on the risk of motor vehicle fatalities are needed, particularly in states where the use and/or possession of cannabis has been legalized, because teenagers may be a passenger in a car where the adult, who has obtained the cannabis legally, is driving. Moreover, the effect of prescribed medications and over-the-counter drugs needs to be conveyed to teenagers and their parents.

Many states and municipalities are examining their laws around drug-impaired driving. At the federal level, bills have been proposed to require states that have legalized cannabis use to also have laws prohibiting an individual from driving while impaired by marijuana and specifying methods for determining cognitive or physical marijuana impairment.[103] Effective models and programs used to help teenagers and parents comply with existing and ever-changing laws around drug-impaired driving must be developed, studied, and disseminated.

Laws Related to Distraction or Technology

Laws pertaining to electronic distraction are variably written and inconsistently enforced. Most states prohibit texting while driving; although some states prohibit handheld cell phone use, others ban all cell phone use. In many jurisdictions, teen drivers under a GDL program are prohibited from using any technology. Studies have been used to suggest that all-age bans reduce the frequency of observed cell phone use[104] and crash rates for young drivers.[72] Bans on the use of electronic communication devices specifically by teen drivers have not been shown to change driver behavior or safety outcomes.[105] Similarly, the effect of laws that are focused on texting is less clear.[106]

On the basis of accumulating evidence about enforceability and efficacy, experts advocate for laws that apply to the use of all handheld devices, laws that apply to all drivers in all driving environments, and laws that make distracted driving violations offenses reportable to insurance companies.[107]

Technological Interventions

Technological advances not only contribute to driver risk and distraction, but can be used to make driving safer as well. Newer model automobiles have safety features that are available to all drivers, including electronic stability control, rear vision cameras, automatic braking, blind spot threat detection, and lane-maintenance alerts.[108,109] In the near future, advanced driver assistance systems may be tailored to teen drivers, guiding them toward less hazardous routes, restricting their car speed via intelligent speed adaptation, and locking out potentially distracting on-board technologies.[110] Parents can be referred to updated lists of new and used vehicles with safety ratings for novice drivers based on the availability of key technologies.[111]

Technologies used to block electronic distraction in the car are available but are not highly regarded by consumers.[112,113] Cellular phone service can be integrated with vehicular controls, reducing the need for handling the device but increasing access to other wireless applications; the risks and benefits of this integration have yet to be adequately studied. Some vehicles now feature teen-specific driving modes or key fobs that limit speed and block access to specific electronic distractions. Similar parental control applications can be added to teen phones to report or to limit access to distracting technologies while in a moving vehicle.[114,115] Finally, some insurers provide client families with in-vehicle monitoring and feedback technology used to assist new teen drivers.[116]

CONCLUSIONS

Driving is a skill, and driver licensure is a rite of passage for adolescents that signals newfound independence. However, the special risks teen drivers face are many. These risks reflect their inexperience, vulnerability to distraction, high prevalence of speeding and kinematic risky driving, lower-than-average use of seat belts, and sensitivity to driving impairment caused by alcohol and other substances. The biological and cognitive substrate of adolescence magnifies these specific challenges as well as the social and emotional imperatives that influence so many aspects of teen behavior, risk appraisal, and decision-making. Policies, programs, and technologies exist to help mitigate these risks but, in most cases, depend on active participation by the teenager and parents. Pediatricians, communities, and governments need to take action to better educate teen drivers and their parents around these risks and strategies to reduce them.

RECOMMENDATIONS

Anticipatory Guidance

Pediatricians can do the following:

- Remind parents that their driving and behavior, including seat belt use and use of wireless technology in the car, serve as a powerful role model for their children and, ultimately, will shape the behavior of their teen drivers.
- Assist parents in identifying adolescents with acute or chronic medical or behavioral risk factors for especially high driving risk.
- Become familiar with components of their state's specific GDL laws to better counsel teen drivers.
- Discuss avoidance of distracted driving and responsible use of technology as components of teen driving safety.
- Continue to counsel adolescents on seat belt use and the risk of alcohol-, illicit substance-, and medication-impaired driving, both as a driver and a passenger.
- Promote the use of active and alternative transport modes (including ride-sharing services) to reduce total teen driving exposure, where this is feasible.
- Encourage parents to practice driving with their teenagers in a variety of environments and for more than the state-required minimum number of hours.

Professional Practice

Pediatricians, their professional organizations, and research funders can do the following:

- Explore with patients and payers the creation of a standardized prelicensure medical visit to promote thoughtful interaction between teenagers, parents, and health care providers around issues related to driving safety. This visit could include the assessment of individual risks, review of the provisions of local GDL laws, and tailored recommendations for specific monitoring or instruction.
- Study the effect of concussion on teen driving to develop, test, and disseminate guidelines for a safe return to driving after a minor traumatic brain injury.
- Advocate for the revision and rigorous testing of driver's education curricula to address the risks and behaviors associated with novice driver crashes and to be evaluated in terms of important outcomes (crashes, near crashes, injury, or death) for durability of effect and application to higher-risk subpopulations.
- Recognize the increased challenges experienced by teenagers with developmental or acquired disabilities and define the role of driving rehabilitation specialists with these individuals.

Community Advocacy

As community experts in child and adolescent health, pediatricians can do the following:

- Advocate for policies and practices that generally improve road safety for all users, including vulnerable novice drivers.
- Promote the availability and use of safe and active alternative routes to school for teenagers to reduce exposure to driving.
- Support later high school start times to help address adolescent chronobiology and associated safety risks.
- Advocate for the availability of nonpunitive and free sober–ride home programs in their community.
- Remind parents, schools, and community organizations that traditional driver education is not sufficient to reduce teen motor vehicle citations, crashes, injury, or death. Although needed to learn the basic operation of a vehicle and the rules of the road, these courses have never been shown to produce "safer" teen drivers.

Legislative Advocacy

Pediatricians can work with local, state, or federal lawmakers to do the following:

- Pass primary enforcement laws for seat belt use, electronic distraction prevention, and GDL compliance.
- Advocate for enactment and enforcement of strong, evidence-based GDL laws.
- Advocate for standards and safety for teenagers who drive as part of their jobs.
- Adopt the use of standard decals or plates to identify learner and intermediate drivers.
- Study the effectiveness, acceptability, and feasibility of extending GDL provisions to novice drivers 18 to 19 years of age.
- Maintain and enforce the minimum legal drinking age and zero tolerance laws for teen drivers.
- Support the improvement and enforcement of other laws designed to limit the underage purchase, possession, and consumption of alcohol, as well as cannabis (in states where it is legalized) and other drugs.

RESOURCES

HealthyChildren

Teen driving safety tips and resources for parents from the American Academy of Pediatrics can be found at https://www.healthychildren.org/English/ages-stages/teen/safety/.

Parents Are the Key to Safe Teen Drivers

https://www.cdc.gov/parentsarethekey/

A Campaign From the Centers for Disease Control and Prevention to Help Parents, Pediatricians, and Communities Keep Teen Drivers Safe on the Road

Teen driving education and resources from the American Automobile Association, including a parent-teen driving agreement can be found at Keys2Drive (http://teendriving.aaa.com).

Teen Driver Source

Free teen driver safety information and downloadable information can be found at http://www.teendriversource.org/.

Prevent Child Injury

A toolkit for injury prevention campaign that is focused on teen driving safety can be found at https://www.preventchildinjury.org/toolkits//teen-driving.

Drive It Home

Lesson plans and tips for parents to help them supervise new teen drivers can be found at http://driveithome.org/.

Association for Driver Rehabilitation Specialists

Help for finding driver rehabilitation specialists that includes fact sheets on driving and specific disabilities can be found at ww.aded.net.

Governors Highway Safety Association

State-by-state listing and comparison of relevant motor vehicle laws, including those applicable to teen or novice drivers can be found at http://www.ghsa.org/state-laws/issues.

Insurance Institute for Highway Safety

An up-to-date reference resource for traffic safety laws, by state and by topic can be found at http://www.iihs.org/iihs/topics#statelaws.

National Highway Traffic Safety Administration

A teen driving information site with links to Parents Central for resources can be found at https://www.nhtsa.gov/road-safety/teen-driving.

Potential Content for Prelicensure Medical Visits

- Review general driving risks by age and experience.
- Review health and safety implications of alternatives to driving, including active transportation, ride-sharing, and public transit.
- Review state-specific graduated licensing provisions.
- Discuss biological risk factors, including but not limited to the following:
  - Chronic conditions
  - Developmental disabilities
  - Sleep
  - Seizure disorder
  - Diabetes
  - Visual acuity or other perceptual challenges
- Discuss cognitive concerns, including but not limited to the following:
  - Role of distraction
  - ADHD
  - Depression
  - Concussion
- Review medications, alcohol use, and other drug use.
- Discuss whether this teenager would benefit from an additional period of supervised driving or use of in-vehicle data recording technology.
- Facilitate a discussion of parent expectations and restrictions on teen driving.
- Discuss and promote the use of a parent–teen driving contract.
- Provide advice or references on selecting the safest family vehicle for the teenager to drive.

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ABBREVIATIONS

ADHD: attention-deficit/hyperactivity disorder
BAC: blood alcohol content
GDL: graduated driver's licensing
MVC: motor vehicle crash

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The Teen Driver

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