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## **Increasing Safe Teenaged Driving:**

### Time to Integrate the Growing Evidence Base

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**Road traffic crashes,** among the top 10 leading causes of death worldwide, are increasingly recognized as a public health priority.<sup>1</sup> Regardless of a country's licensing policies, novice drivers are at increased risk for crashes.<sup>2–4</sup> In the United States, which allows driving at a relatively young age (14–16 years), motor vehicle crashes are the leading cause of death for teenagers. With increasing awareness of the high motor vehicle crash rates among newly licensed teenaged drivers have come interventions to prevent crashes and reduce their health burden.

Legislative approaches have been a major component of these interventions. For example, graduated driver's licen-sure (GDL) policies limit risky driving situations (eg, teenaged passengers, mobile phone use, late night driving) and gradually allow more responsibility as new drivers gain driving experience. A strong body of research has demonstrated that GDL policies have been effective in reducing crashes in novice drivers,<sup>5,6</sup> and a New Jersey license decal program that improved enforcement of GDL laws was also associated with lower crash incidence in new drivers.<sup>7</sup> Although evaluations of other policies focused on young drivers such as zero-tolerance alcohol policies are less frequent, they also generally show that policy approaches are effective.<sup>8</sup> The presence of primary enforcement of seat belt laws, which reduce crash risk for all drivers, has been important in reducing serious injury and death when a crash has occurred and encourage seat belt use among older drivers who provide the role model for youth. Despite these policies, crash rates for teenaged drivers remain unacceptably high, and effective prevention programs are needed.

An evidence base for teenaged driving interventions is emerging. Existing approaches have several goals: increase and/or improve supervised driving practice, which is primarily done with parents; provide information to teenagers and parents about driving behavior and performance, thus allowing parents to be more informed about their teenager's driving behavior; increase the role of parents in monitoring independent teenaged driving, usually through a contract that creates agreement in rules and expectations and provides increasing

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opportunities for independent driving; and increase and improve parent communication. Existing approaches also use a range of delivery methods, from passive information provided to teenagers and parents to in-vehicle video feedback devices.<sup>9–11</sup> Research on innovative new methods for intervention delivery are needed, such as options for financial incentives through insurance programs, approaches for early identification and targeting of high-risk drivers, and programs that introduce a safe driving culture in early childhood.

One challenge for this emerging field is to identify the "sweet spots" that balance the intervention's reach to the optimal population with program cost, timing, and acceptability. For example, in-vehicle video devices show strong effects in reducing driving errors, but they are not easily scalable to a broad audience due to a perception of cost and initial concerns over invasion of privacy. However, they effectively provide objective information to parents and teenagers to identify "coachable" moments, with the goal of improving driving by learning from near-miss opportunities. At the other end of the spectrum, interventions that provide information to teenagers and parents through a variety of multimedia delivery methods are less expensive and have been less effective in the absence of driving laws.

Aiming to fill the gap in evidence-based parent-focused interventions, Mirman and colleagues<sup>12</sup> evaluated the Teen Driving Plan (TDP) in this issue of *JAMA Pediatrics*. The TDP aims to increase the quantity and diversity of parent-supervised driving by providing parents with an online tool that includes a practice log, a video library of tutorials to assist in optimizing supervised driving, and information for parents on parent-teenager relationships. <sup>13</sup> With 217 parent-teenager dyads, Mir-man et al found that teenagers whose parents had access to the TDP completed significantly more driving practice in 5 of 6 measured environments (eg, parking lots, residential neighborhoods, at night, or in bad weather). Teenagers also took an on-road driving test proctored by trained driving evaluators, and the teenagers participating in the intervention were significantly more likely to complete the driving test successfully than were control teenagers.

Several features of this study are innovative. First, driving intervention studies often rely on self-report outcome measures, and examining on-road driving skill provided an objective performance outcome. Second, this web-based intervention has the potential for dissemination to a wide audience. Although the TDP program involved a telephone follow-up for families who had not logged into the system regularly, the remainder of the program was entirely web based. Third is the timing of the intervention, which was administered before independent driving and helped parents to engage teenagers during supervised driving.

One challenge in the evaluation of studies such as this is access to the highest-risk drivers, who may be less likely to participate in such programs. A limit of evaluation research in general, selection bias is likely to affect these studies. Driving intervention studies are attractive to participants who are already interested in driving safety. Some studies also require that participants have driving experience or unlimited access to a vehicle, screening out teenagers who are not primary drivers of their own cars or who do not have access to a car for sufficient time to meet minimum driving exposure criteria. Selective exclusion of

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low-volume drivers will restrict participation by low-resource families and may also exclude less experienced drivers who have a higher risk for driving error per mile driven. Successful scaling of interventions to wider audiences will require approaches that overcome these selection biases.

Research to improve safe teenaged driving thus has several areas of priority. Foundational research to identify the characteristics of high-risk drivers is needed to help overcome selection biases and to inform the design of interventions. Approaches ranging from epidemiologic to naturalistic studies will be needed to fill current knowledge gaps. Evaluations to show the effectiveness of programs are needed, as well as evaluations that provide information about reach, scalability, and cost benefit. As the evidence base grows, translation and cost-effectiveness studies that examine the impact of crash risk in real-world settings are needed.

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