



THE ROLE OF NATIONAL ROAD ADMINISTRATIONS IN ROAD SAFETY EDUCATION FOR CHILDREN

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Abstract

Road safety remains a major societal challenge, as highlighted by global road safety assessments [1], with excessive and inappropriate speed continuing to be a leading factor in severe road accidents on national road networks. While enforcement and infrastructure-based measures are essential components of road safety strategies, their long-term effectiveness depends increasingly on complementary interventions targeting road user behavior. In this context, road safety education, particularly for children, plays a critical role in fostering a sustainable culture of safe mobility. The paper further discusses how NRAs can act as coordinators and facilitators of road safety education through partnerships with educational institutions and public authorities. A national initiative currently under preparation in Romania, supported through European recovery funding, is presented as a prospective example of institutional involvement in child-focused road safety education [2]. By highlighting planned actions and governance aspects rather than implementation outcomes, the paper provides a forward-looking perspective on how NRAs can strengthen their contribution to long-term road safety objectives through education.

Keywords: road safety education, national road administrations, speed-related accidents, child road safety, institutional responsibility

1 Introduction

National road networks are increasingly exposed to complex risk factors associated with higher traffic volumes, diverse road user categories, and persistent unsafe driving behaviors. Among these factors, excessive and inappropriate speed consistently emerges as one of the main contributors to severe and fatal road accidents. Traditional road safety approaches have focused primarily on engineering solutions and enforcement mechanisms, such as infrastructure upgrades, traffic control devices, and police supervision. While these measures are indispensable, their impact is often limited when behavioral aspects are not addressed in parallel. Road safety education is increasingly recognized as a fundamental element of the Safe System approach, contributing to long-term behavioral change rather than immediate compliance alone. Education initiatives aimed at children are particularly important, as they influence individuals at an early stage, when perceptions of risk and mobility habits are still forming. In this evolving context, the role of National Road Administrations extends beyond the design, construction, and maintenance of road infrastructure. As custodians of national road networks and key actors in road safety governance, NRAs are increasingly expected to contribute to broader safety objectives, including education and awareness.

2 Speed and accident severity: selected national indicators

Speed-related behavior remains one of the most significant contributors to road accident severity on national road networks [3-5]. Numerous national and international road safety analyses consistently demonstrate that higher vehicle speeds increase both the probability of severe injury and the likelihood of fatal outcomes [5]. This relationship is particularly pronounced on national roads outside urban areas, where higher operating speeds and mixed traffic conditions create complex risk environments. According to the Romanian Road Safety Bulletin 2025, Romania continues to record one of the highest road fatality rates in the European Union, with over 1,600 fatalities annually, while excessive or inappropriate speed remains a contributing factor in a significant share of serious crashes. Children and young road users represent a particularly vulnerable group, frequently involved as passengers, pedestrians, or cyclists in mixed traffic environments [6]. In Romania, children account for a significant share of vulnerable road user casualties, with official statistics indicating several hundred child injuries annually in road traffic crashes, mainly occurring in urban and peri-urban environments and frequently involving speeding or failure to yield [6]. Speed acts not only as a direct risk factor, but also as an amplifying mechanism for other accident-related factors. Increased speed reduces reaction time, extends braking distances, and diminishes the driver's ability to respond to unexpected events. These mechanisms explain why speed is strongly correlated with accident severity rather than with accident frequency alone. This relationship is illustrated in figure 1.



Figure 1 Relationship between vehicle speed and accident severity on national road networks (source: Authors' conceptual representation)

From an institutional perspective, the persistence of speed-related severe accidents highlights the limitations of relying exclusively on enforcement-based approaches. Speed enforcement systems, including police controls and automated enforcement technologies, are effective in specific locations and time intervals. However, their impact is often localized and dependent on continuous supervision, making it difficult to achieve sustained behavioral change across the entire road network. Key national indicators related to speed and accident severity are summarized in table 1.

Table 1 Selected national road safety indicators related to speed and accident severity [4-6]

Indicator	Observed trend	Safety implication
Speed as contributing factor	High involvement in severe accidents	Strong link to fatal and serious injuries
Accident location	Predominantly extra-urban / national roads	Higher operating speeds increase severity
Vulnerable road users	Significant share of severe outcomes	Increased exposure to high-speed traffic
Children involvement	Indirectly affected as pedestrians/ passengers	Heightened vulnerability in unsafe environments

These indicators confirm that speed-related risks extend beyond infrastructure and enforcement, being closely linked to road user behavior and long-term driving culture. While engineering and enforcement remain essential, their impact is limited in the absence of complementary preventive measures. Early road safety education therefore represents a strategic intervention for shaping attitudes toward speed, risk, and responsibility, providing a basis for sustained reductions in accident severity and motivating the transition toward education-focused approaches discussed in the following section.

3 From enforcement to education: why early intervention matters

Road safety strategies have traditionally relied on enforcement and engineering measures as primary instruments for accident reduction. While speed limits, police controls, automated enforcement, and infrastructure interventions remain essential components of national frameworks, international evidence indicates that these measures alone are insufficient to achieve sustained reductions in accident severity. Enforcement-based approaches are largely reactive, addressing unsafe behavior after it occurs and offering limited influence on long-term attitudes and driving culture. Although short-term compliance may be observed in controlled locations, speed-related behavior often persists once enforcement pressure decreases.

3.1 Behavioral factors and the limits of enforcement

Behavioral patterns are typically formed over long periods and are shaped by repeated exposure to traffic environments, social influence, and early learning experiences. As a result, interventions targeting adult drivers often face resistance or produce only incremental changes. This observation reinforces the need for preventive measures that address behavior formation at earlier stages. The conceptual relationship between enforcement, behavior, and long-term outcomes is presented in figure 2.

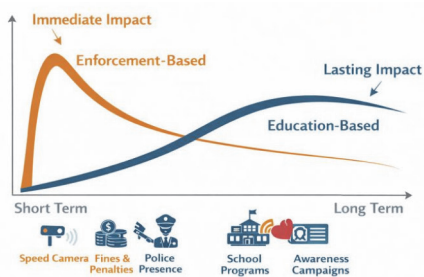


Figure 2 Conceptual relationship between enforcement measures, driver behavior, and long-term road safety outcomes (source: authors' conceptual representation)

3.2 Education as a preventive road safety measure

Road safety education represents a preventive intervention aimed at shaping how road users perceive risk, responsibility, and acceptable behavior before unsafe patterns become established, complementing engineering and enforcement measures. Early education is particularly effective, as it targets individuals while behavioral norms are still forming, influencing attitudes toward speed, risk-taking, and shared responsibility that often persist in adulthood. In addition to long-term effects, education also improves children's immediate safety as vulnerable road users by enhancing risk awareness within traffic environments.

This perspective is supported by international evidence indicating that early road safety education contributes to improved risk perception and sustained behavioral change among young road users [3, 5, 7].

3.3 Linking early education to the safe system approach

The importance of early road safety education aligns closely with the principles of the Safe System approach, which recognizes that human error is inevitable and that road safety systems must be designed to minimize the consequences of such errors. Within this framework, education plays a key role in shaping safer behavior and supporting system-wide resilience. By influencing how future road users perceive speed, risk, and responsibility, education contributes to a safety culture that complements infrastructure design and enforcement. Rather than replacing traditional measures, education enhances their effectiveness by fostering voluntary compliance and informed decision-making. A comparative overview of enforcement-based and education-based interventions is provided in table 2.

Table 2 Comparison between enforcement-based and education-based road safety interventions [3, 5, 7]

Aspect	Enforcement-based measures	Education-based measures
Time horizon	Short to medium term	Medium to long term
Target group	Current road users	Future and current road users
Behavioral impact	Compliance-driven	Attitude- and culture-driven
Sustainability	Dependent on monitoring	Self-reinforcing over time
Role in Safe System	Corrective	Preventive

The transition from enforcement-focused approaches to education-oriented strategies does not imply a reduction in the importance of traditional road safety measures. Instead, it reflects a growing recognition that sustainable safety improvements require a balanced combination of engineering, enforcement, and education. Early intervention through education provides a mechanism for addressing the root causes of unsafe behavior, particularly in relation to speed, which remains one of the most persistent risk factors in road safety. This perspective highlights the need for institutional actors with a long-term mandate over road networks to engage actively in road safety education. Experience gained from pilot road safety interventions on national roads highlights the importance of an active institutional role in addressing behavioral risk factors that cannot be fully mitigated through infrastructure measures alone. As custodians of national road infrastructure and key stakeholders in road safety governance, National Road Administrations are uniquely positioned to support and coordinate educational initiatives. This extended role, and its practical implications, are examined in the following chapter.

4 The role of national road administrations in road safety education for children

National Road Administrations (NRAs) play a central role in road safety governance through their responsibility for planning, operating, and maintaining national road networks. Traditionally, this role has been associated primarily with engineering and infrastructure-based interventions aimed at reducing accident risk. However, the persistence of severe accidents linked to behavioral factors, particularly speed-related behavior, has highlighted the need for a broader and more integrated approach to road safety. It should be noted that institutional responsibilities for road safety differ across EU Member States.

In several countries, primary responsibility lies with Ministries of Interior or Transport rather than National Road Administrations. Nevertheless, regardless of formal governance structures, NRAs remain key actors in infrastructure-related safety management and can actively support preventive initiatives through coordination, technical expertise, and partnerships with education authorities and other national bodies. In this context, effective road safety education requires close cooperation between road administrations, ministries responsible for education, law enforcement agencies, and local communities. In this context, the role of NRAs is increasingly evolving beyond infrastructure provision towards a more comprehensive responsibility that includes preventive and non-engineering measures. Road safety education, especially for children, represents a key area where NRAs can contribute to long-term safety outcomes by addressing the behavioral roots of accident risk.

4.1 Extended institutional and moral responsibility of NRAs

As custodians of national road networks, NRAs are uniquely positioned at the intersection of infrastructure, policy, and public safety. Their long-term mandate over road assets and their access to safety-related data confer not only technical authority, but also an institutional responsibility to contribute to broader road safety objectives. This responsibility extends beyond compliance with regulatory requirements and encompasses a moral obligation to act proactively in areas where infrastructure alone cannot fully mitigate risk. Road safety education for children represents a strategic form of indirect intervention. While children are not responsible for traffic system design or enforcement, they are both current and future road users whose safety is directly affected by adult behavior and system-level decisions. By supporting educational initiatives, NRAs can influence the development of safer attitudes and behaviors at an early stage, contributing to a sustainable culture of road safety. This extended responsibility does not imply that NRAs replace educational institutions or law enforcement agencies. Rather, NRAs act as facilitators and coordinators, leveraging their institutional capacity to support, fund, and integrate educational actions within national road safety strategies. The extended institutional role of NRAs is illustrated in figure 3.



Figure 3 Extended role of National Road Administrations in road safety, integrating infrastructure, enforcement support, and education (source: authors' conceptual representation)

4.2 Education as an indirect safety measure for children

Education-oriented interventions differ fundamentally from traditional road safety measures in both scope and time horizon. While engineering and enforcement measures aim to reduce risk in the short term, education targets long-term behavioral change by shaping how individuals perceive speed, risk, and responsibility. For children, this process is particularly impactful, as it influences attitudes before unsafe behavioral patterns are established.

Children interact with road environments daily as pedestrians, cyclists, and passengers. Their exposure to traffic risks is often shaped by high-speed environments on national roads and by adult driving behavior. Educational initiatives aimed at children therefore serve a dual purpose: enhancing immediate awareness and safety, while also contributing to the formation of responsible future road users. From an NRA perspective, education functions as a complementary safety measure that reinforces the effectiveness of infrastructure and enforcement. By promoting understanding of road rules, safe behavior, and the consequences of speed, education supports voluntary compliance and risk-aware decision-making, which cannot be achieved through enforcement alone. The main roles of NRAs in child-focused road safety education are summarized in table 3.

Table 3 Roles of National Road Administrations in child-focused road safety education

Area of involvement	NRA role	Expected contribution
Strategic planning	Integration of education into road safety strategies	Long-term behavioral impact
Coordination	Partnerships with schools and public authorities	Coherent national approach
Funding and support	Allocation of resources for educational initiatives	Program sustainability
Awareness and outreach	National campaigns and materials	Increased public visibility
Evaluation support	Use of safety data to guide initiatives	Evidence-informed education

4.3 A National initiative in Romania: planned actions under PNRR

In response to persistent road safety challenges highlighted by national statistics, a child-focused road safety education initiative coordinated by the national road administration has been initiated in Romania under the European recovery and resilience framework. At the time of writing, the initiative is in the preparation and procurement phase, with implementation planned following the completion of ongoing procedures. The initiative is designed to support road safety education for children through a combination of awareness campaigns, educational materials, and coordinated outreach activities. Importantly, the initiative reflects a governance-oriented approach rather than a short-term campaign. The role of the National Road Administration is defined primarily as a coordinator and enabler, ensuring alignment with national safety priorities, consistency of messaging, and efficient use of public resources. By embedding education within institutional road safety strategies, the initiative illustrates how NRAs can operationalize their extended responsibility in a practical and policy-consistent manner. This chapter demonstrates that road safety education for children represents a legitimate and necessary extension of the traditional role of National Road Administrations. By acting beyond infrastructure provision and enforcement support, NRAs can address the behavioral dimensions of road safety that underpin persistent accident risks. The Romanian initiative, although still in preparation phase, provides a relevant example of how institutional responsibility can be translated into planned action, reinforcing the link between accident data, education, and long-term safety objectives.

4.4 Planned scope and quantitative dimensions of educational actions

In Romania, the national child-focused road safety education initiative currently under preparation has been designed as a large-scale program with clearly defined implementation parameters. The project framework includes the development of audiovisual educational materials and the distribution of road safety education kits targeting multiple age groups and educational contexts. These materials aim to communicate key road safety messages related to speed awareness, safe behavior in traffic, and shared responsibility, while supporting interactive learning in schools and community-based programs. The scale of distribution reflects the objective of achieving nationwide coverage and sustained exposure rather than isolated interventions. The planned educational components and their quantitative dimensions are presented in table 4.

Table 4 Planned educational components and indicative quantitative parameters of the national initiative

Educational component	Planned quantitative parameters	Intended role
Educational video productions	Approx. 10–15 video materials	National awareness and repeated educational use
Filming sessions	Approx. 20–30 dedicated filming days	Professional and contextualized content creation
Road safety education kits	Tens of thousands of kits	Large-scale child engagement in schools
Interactive educational activities	Hundreds of planned sessions	Direct interaction and reinforcement
Dissemination channels	National and regional platforms	Broad and consistent message reach

From an institutional perspective, the inclusion of explicit quantitative planning parameters serves multiple purposes. First, it demonstrates the scale and seriousness of the initiative, distinguishing it from short-term or symbolic awareness campaigns. Second, it enables transparency and accountability in the use of public funding, particularly in the context of European recovery and resilience financing. Third, it provides a basis for future monitoring and evaluation, without implying immediate or guaranteed safety outcomes. By integrating quantified planning elements within a broader educational framework, the initiative illustrates how National Road Administrations can operationalize their extended responsibility for road safety. The emphasis on scale, consistency, and institutional coordination reinforces the role of NRAs as key actors in shaping a sustainable road safety culture, particularly for younger generations. The effectiveness of the planned educational initiative is intended to be monitored through a set of qualitative and quantitative indicators, including the number of schools reached, educational materials distributed, media coverage, and participant engagement. In addition, outcome-oriented indicators such as changes in risk awareness and observed behavioral patterns will be assessed through periodic evaluations in cooperation with education authorities. These actions are aligned with Romania’s national road safety objectives and the EU Road Safety Policy Framework 2021–2030, supporting the broader Vision Zero ambition of reducing fatalities and serious injuries.

5 Conclusion

The analysis highlights the need for an integrated approach to road safety governance in which engineering and enforcement measures are complemented by preventive and educational interventions. National road safety indicators confirm that speed-related behavior remains a dominant contributor to accident severity, demonstrating that technical solutions alone are insufficient to achieve sustained safety improvements. Road safety education, particularly when addressed to children, represents a strategic long-term intervention capable of shaping attitudes, risk perception, and behavioral norms while also improving the immediate safety of vulnerable road users. In this context, National Road Administrations can play a complementary role by extending their traditional infrastructure responsibilities to support education-focused initiatives addressing behavioral dimensions of road safety. The Romanian initiative illustrates how such an extended role can be operationalized through structured educational planning and institutional coordination. Integrating education within national road safety frameworks supports the development of a sustainable safety culture and aligns with European objectives aimed at reducing accident severity and protecting vulnerable road users over the long term [8].

References

- [1] World Health Organization, Global Status Report on Road Safety, WHO Press, Geneva, Switzerland, 2018.
- [2] National Company for Road Infrastructure Administration (CNAIR), National Road Safety Education Initiative for Children – Project Framework, institutional documentation, Bucharest, Romania, 2023.
- [3] International Transport Forum, The Safe System Approach in Action, OECD Publishing, Paris, France, 2022.
- [4] European Transport Safety Council, Managing Speed: The Key to Road Safety, ETSC, Brussels, Belgium, 2019.
- [5] European Road Safety Observatory, Speed and Speed Management, European Commission, Brussels, Belgium, 2023.
- [6] Romanian Police – Traffic Department, Buletinul Siguranței Rutiere 2025, Bucharest, Romania, 2025.
- [7] International Road Federation, Road Safety Manual for Decision-Makers and Practitioners, IRF, Geneva, Switzerland, 2021.
- [8] European Commission, EU Road Safety Policy Framework 2021–2030 – Next steps towards ‘Vision Zero’, Official Journal of the European Union, Brussels, Belgium, 2021.