

# A scoping review of national policies for child road injury in China

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## Summary

There has been limited examination of child road injury policies. This study aims to systematically characterize national policies relevant to child road safety in China over the past two decades and identify potential gaps based on the WHO child road safety framework. As a scoping review, this study searched for national policies for child road safety on the websites of government agencies. A total of 22,487 policies were searched, of which 103 policies issued by 37 institutions, were included in the analysis, including 12 policies jointly developed by multiple agencies. Mapping identified policies to strategies in the WHO framework, most WHO strategies requiring legislation were found to be in place in China and to fully meet the intent of the WHO recommendation. The single exception was in the area of child restraints which was deemed to not be fully covered due to a lack of eligible policies on enforcement of child restraint use laws. Two strategies requiring standards were fully covered; eight strategies requiring policy support were partially or not covered, mainly related to equipping emergency vehicles with child-appropriate medical equipment. Enhancing school bus safety was identified as a policy focus area in China beyond those recommended by the WHO framework. This study identified three areas for improvement: (1) strengthening road safety policies targeting children, (2) strengthening enforcement of legislation, e.g., child restraint use, and (3) increasing multiple-sector cooperation on policy formulation.

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## Background

Road traffic injury is the leading cause of death for children and young people aged 5–29 globally.<sup>1</sup> To achieve the Sustainable Development Goals (SDGs) target of halving road traffic injuries and deaths by 2030, the United Nations Decade for Road Safety Action 2021–2030 (UN Action) recommends promoting use of helmets and seat belts, controlling speeding, controlling drinking and driving, appropriate road design, and enhanced safety of vehicles.<sup>2</sup> For children, WHO has

‘Ten Strategies for Keeping Children Safe on the Road (WHO framework) (Appendix Table S1).<sup>3</sup> The pathway for achieving these is through policy-level action and many countries have implemented policies aligned with this guidance.<sup>1</sup> However, policy gaps still exist, and identifying these is critical for determining where further actions are needed.<sup>1</sup>

As an upper middle-income country, the population in China accounts for about 18% of the world’s population, and around 16–19% of global road deaths.<sup>1,4,5</sup> Furthermore, road traffic injury is the second leading cause of death for children aged 0–14 in China.<sup>6</sup> Improving road safety in China is thus expected to help achieve the SDG’s target.<sup>1</sup> China issued its first national road safety law in 2003. After this law, the government successively issued additional relevant policies to

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## Research in context

### Evidence before this study

Road injury is an important cause of the disease burden in China, especially for children. According to best practice the pathway for implementing the many countermeasures needed to reduce this burden is through policy-level action. While general road safety laws and policies in China have been previously summarized in the literature, there has been limited examination of how these policies relate to children in China.

### Added value of this study

This study comprehensively identified the national policies on child road safety in China for the first time. Through this study, potential policy gaps as compared to the framework recommended by WHO have been identified, providing evidence for formulating further child road safety policies in China. The results indicate that compared with the WHO framework, most of the framework content has policy

coverage (80.4%) in China. Content not covered by policies included policies on the enforcement of using child restraint systems, and equipping emergency vehicles with child-appropriate medical equipment. Policies related to school bus safety in China were identified as a policy focus area beyond the WHO framework. This study also provides the timeline of development of child road safety policies, which may provide insight for other low- and middle-income countries working to improve their child road safety policies.

### Implication of all the available evidence

This study shows the characteristics of child road safety policies in China and provides recommendation for further improvement. The results will assist promotion for development of further national policies targeting child road safety in China and provide evidence for other countries on the development of child road safety policies.

promote road safety which include some policies that should benefit child road safety.<sup>6,7</sup> However, while general road safety laws and policies in China have been previously summarized in the literature,<sup>7–10</sup> there has been limited examination of how these policies relate to children in China.<sup>11</sup> There is a need to understand the coverage of child road safety policies as a first step in prioritizing what needs to be done to further reduce the child road traffic burden in China.

WHO has published a number of compilations of strategies that have been identified as being important for reducing risk of road traffic injury, however most of these relate to the overall population with many of the included strategies not specific to child road users.<sup>1,3,12</sup> The exception is their 2015 document “Ten strategies for keeping children safe on the road”.<sup>3</sup> This document represents current best practice for child road safety.

This scoping review aims to systematically map policies related to child road safety in China and compare them with WHO recommendations to identify gaps in child road injury policies in China. In addition to identifying scope for action to further improve the policy landscape in China, this work will demonstrate a benchmarking exercise that may be of interest to other regional countries.

## Methods

The protocol was registered prospectively in the Open Science Framework (<https://osf.io/cxvwy>). This review follows the Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for Scoping Reviews (PRISMA-ScR) Checklist.<sup>13</sup>

## Benchmark strategy framework

The Ten Strategies for Keeping Children Safe on the Road was used in this study as an analytical framework.

It was formulated in 2014 by WHO.<sup>3</sup> It integrates a well-known package of measures as a set of best practices to protect child road safety. These measures include legislation and enforcement targeting risk factors such as speeding, drunk driving, helmets, seat belts, and child restraints, as well as building roads to promote safety, producing vehicles to protect safety, and providing emergency care for the injured. These ten strategies echo the necessity of improving road safety for everyone, emphasized in the Global Plan for the Decade of Road Safety Action 2011–2020, and point out that safer roads for all mean safer roads for children. The content of Ten Strategies for Keeping Children Safe on the Road is shown in [Appendix Table 1](#). However, to ensure the full landscape of policies impacting child road safety were captured, the search criteria, data capture, and synthesis of results was not restricted to only those strategies explicitly included in the WHO's ten strategies.

## Search strategy and selection criteria

Information sources were (1) websites of the National People's Congress (NPC) and State Council (2) websites of all ministries affiliated with the State Council, and (3) websites of other child affairs relevant organizations ([Appendix 1](#)). These were supplemented by a review of Chinese documents datasets ([Appendix 2](#) Chinese documents datasets) and websites of the National public service platform for standard information.

The inclusion criteria were current policy documents (1) publicly published by NPC, State Council, ministries at the national level affiliated to the State Council or other child affairs relevant organizations issued from October. 28. 2003 (when the Road Traffic Safety Law of

the People's Republic of China was issued) to April, 30, 2023; and (2) the content of the policy aligned with the intent of the WHO framework or impacted child road safety.

Policies were excluded if they had been repealed, they related to an event, festival, or the type and functions of the policy documents were not relevant to the purpose of this analysis.

We conducted an independent manual search on each data source. We searched with keywords related to roads, vehicles, road users, emergency treatment, transportation, and collisions as detailed in [Appendix 3](#). All searches were conducted in Chinese. Keywords explicitly related to children were not used as most policies were not specifically designed for specific age groups. For example, as noted above, policies related to speeding and drink-driving cover the general population, and the policy content does not necessarily refer to children. However, the legal documents that restrict speeding and drink-driving substantially impact on child road safety. We also did not combine keywords because most search engines on government websites did not permit Boolean operators (e.g. AND, OR).<sup>14</sup> Detailed search strategies for each government website are provided in [Appendix Table S4](#).

### Data screening and extraction

Two reviewers (YJ and PY) were responsible for screening and extraction, following a four-step manual process.

1. Merging results from different websites and search keywords (YJ);
2. Screening titles and removing them based on the inclusion criteria, (YJ);
3. Screening the full policy document based on both inclusion and exclusion criteria (YJ and PY);
4. Extracting data from included policy documents (YJ and PY).

If there were discrepancies, they were discussed with a third senior researcher (LD) to reach a consensus.

The extracted data included title, release date, release authorities or organizations and policy type. We used Microsoft Office Excel 2013 to record and organize extracted data.

### Analytical framework

A two-dimensional analytical framework was designed to address the study aims (See [Table 1](#)). The WHO framework formed the Y-axis. It contains ten primary strategies and forty-six secondary strategies. The secondary strategies describe specific activities related to a primary strategy (e.g. for the primary strategy 'control speed', secondary strategies are enforcing speed limits through cameras; building or modifying roads to

include features that limit speed). The X-axis represents different policy types, such as law, regulation and ministerial act, mandatory standard, voluntary standard, executive policy document, and strategic planning document. The definition of policy types is shown in [Appendix 4](#). This framework was used to compare the current government promotion of child road safety within identified policy documents and the WHO recommended strategies. Policies identified during the search directly related to child road safety, but beyond the scope of the ten WHO strategies were also collected for completeness of the child road safety policy landscape in the search.

### Synthesis of results

Data extracted from the included policies were tabulated, and the full text of each policy was encoded and analyzed using the above framework. The content was deemed to meet the WHO strategy if it aligned with the intent of one of the WHO secondary strategies listed within each of the ten primary strategies. This included policy content that expressly matched the intent of a WHO strategy, was related but more stringent than the detail articulated in the WHO strategy, or if the content covered the strategy in some way. Each policy document identified to meet one of the WHO strategies was counted as 'one policy support'. If a strategy was covered by multiple policies, it was marked as 'multiple policy support'. If a strategy was partially covered by identified policies, the content covered and not covered were marked separately.

### Role of the funding source

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### Result

The search yielded 22,487 records, of which 7521 duplicates and 8250 non-eligible records were removed. Of the remaining 6716 policies, 103 met the inclusion criteria and were analyzed ([Fig. 1](#)). There were twenty-three legal documents (three were laws, twenty were regulations and ministerial acts), twenty standards (thirteen were mandatory, seven were voluntary) and sixty policy documents, of which there were thirty-six executive and twenty-four strategic planning policy documents ([Appendix Table S3](#)).

We identified thirty-seven governmental sectors and organizations that issued relevant policies. The National People's Congress formulated all laws. The regulations were all issued by the State councils, and ministerial acts

Primary strategies	Secondary strategies	Type of policies required <sup>a</sup>	Legal documents		Policy document		Standard		Extent to which recommendation is covered <sup>c</sup>
			Law	Regulation and ministerial act	Executive	Strategic	Mandatory	Voluntary	
Strategy 1 Controlling speed	1 Setting and enforcing speed limits appropriate to the function of each road;	Legislation	2 <sup>b</sup>	3	2	4			Fully
	2 Setting and enforcing a maximum speed limit of 30 km/h on high pedestrians concentrations road;	Legislation						1	Fully
	3 Enforcing speed limits through the use of automatic speed cameras;	Legislation		3					Fully
	4 Building or modifying roads to include features that limit speed.	No mention	1	1		1	1		Fully
Strategy 2 Reducing drinking and driving	1 Setting and enforcing BAC limit of 0.05 g/dl or less for all drivers, and 0.02 g/dl or less for young drivers;	Legislation	2	4	1	2	1		Fully
	2 Enforcing drinking and driving laws through sobriety check points and random breath testing;	Legislation		2					Fully
	3 Restricting the sale of alcohol by legislating a minimum purchase age and types and hours of sales;	No mention							Partially
	a Restricting the sale of alcohol by legislating a minimum purchase age;	No mention	1						
	b Restricting the sale of alcohol by legislating types and hours of sales;	No mention							
4 Limiting the marketing of alcohol to children.	No mention	1						Fully	
Strategy 3 Using helmets for bicyclists and motorcyclists	1 Mandating and enforcing motorcycle helmet laws that stipulate the type and fit of helmets by age;	Legislation	1		1	1			Fully
	2 Putting in place internationally recognized manufacturing standards;	Standard					1		Fully
	3 Ensuring the availability and affordability of motorcycle helmets;	No mention			1				Fully
	4 Supporting community-based initiatives by educating parents and providing free/discounted helmets for children;	No mention			1	1			Fully
Strategy 4 Restraining children in vehicles	1 Mandating and enforcing child restraint laws;	Legislation							Partially
	a Mandating child restraint laws;		1						
	b Enforcing child restraint laws;								
	2 Putting in place internationally recognized manufacturing standards;	Standard					2		Fully
	3 Ensuring the availability and affordability of child restraints;	No mention							No
	4 Obliging vehicle manufacturers to have plug-in attachments for car seats in all private vehicles;	No mention							No
	5 Promoting child restraint loan schemes and educating families on use of restraints.	No mention							Partially
a Promoting child restraint loan schemes;									
b Educating families on use of restraints.				1	1				
Strategy 5 Improving children's ability to see and be seen	1 Wearing white or light-coloured clothing;	No mention						1	Fully
	2 Using retro-reflective strips on clothing or articles;	No mention			1	1		2	Fully
	3 Forming "walking buses", through which adult volunteers accompany groups of children;	No mention			2				Fully
	4 Appointing crossing guards who wear reflective vests around schools;	No mention			1			1	Fully
	5 Using headlamps on bicycles as well as front, rear and wheel reflectors;	No mention					1		Fully
	6 Using daytime running lights on motorcycles and vehicles;	No mention					1		Fully
	7 Making sure that streets are as "uncluttered" as possible and enhancing street lighting.	No mention	1		1	1	2	1	Fully

(Table 1 continues on next page)

Primary strategies	Secondary strategies	Type of policies required <sup>a</sup>	Legal documents		Policy document		Standard		Extent to which recommendation is covered <sup>c</sup>
			Law	Regulation and ministerial act	Executive	Strategic	Mandatory	Voluntary	
(Continued from previous page)									
Strategy 6 Enhancing road infrastructure	1 Implementing physical measures;	No mention	1	1		1	1	1	Fully
	2 Separating different types of traffic and road users through mechanisms;	No mention	1	1	1		1		Fully
	3 Creating car-free zones to enhance the safety of pedestrians;	No mention			1	1			Fully
	4 Introducing school safety zones which include a package of speed reduction measures, car-free zones, safe drop-off and pick-up points and crossing guards;	No mention		1	1			1	Fully
	5 Increasing crossing times at signalized intersections that are close to schools;	No mention						1	Fully
	6 Designating play areas for children away from the road; designating play areas for children away from the road;	No mention			1				Fully
	7 Investing in safe public transport.	No mention		3	3	6		1	Fully
Strategy 7 Adapting vehicle design	1 Mandating the installation of energy-absorbing crumple zones to protect passengers inside a vehicle in the event of a road traffic crash;	Legislation					4	1	Fully
	2 Redesigning vehicle fronts to make them more “pedestrian friendly”;	No mention						1	Fully
	3 Equipping vehicles with cameras and audible alarms that can detect small objects missed by the rear-view mirror;	No mention							No
	4 Installing alcohol interlock systems in the vehicles of people convicted of drinking and driving.	No mention							No
Strategy 8 Reducing risks for young drivers	1 Lowering BAC levels for young or novice drivers;	No mention	2	2	1	1	1		Fully
	2 Driving with a responsible adult for a designated period of time while learning to drive;	No mention		1					Fully
	3 Restricting nighttime driving and driving with passengers;	No mention							No
	4 Insisting on zero tolerance for any traffic offenses, including texting while driving.	No mention		1					Fully
Strategy 9 Providing appropriate care for injured children	1 Providing caretaker and teacher education on safe immediate stabilization of injuries, and establishing advance plans for activating formal or informal systems to transport injured children to care facilities;	No mention	4		10	7			Fully
	2 Training prehospital and facility-based providers in the physiologic differences between children and adults, and on how to meet the distinct treatment needs of children;	No mention	1		6				Fully
	3 Where formal prehospital systems exist, equipping emergency vehicles with child-sized medical equipment and supplies;	No mention							No
	4 Making hospitals as “child-friendly” as possible to minimize additional trauma for injured children;	No mention			1				Fully
	5 Improving pediatric-specific rehabilitation services, especially home-based rehabilitation prescriptions, and including access to community-based rehabilitation centers;	No mention	1		7	3			Fully
	6 Improving access to counselling services both to mitigate the psychological impact of road traffic injury on children and their families and to address practical considerations, including legislative and financial queries.	No mention	1		3	5			Fully

(Table 1 continues on next page)

Primary strategies	Secondary strategies	Type of policies required <sup>a</sup>		Legal documents		Policy document		Standard	Extent to which recommendation is covered <sup>c</sup>
		Law	Regulation and ministerial act	Executive	Strategic	Mandatory	Voluntary		
(Continued from previous page)									
Strategy 10 Supervising children around roads		No mention	1			1			Fully
Additional Strategy School bus safety		-	1	3	9	2	1		Fully

<sup>a</sup>The type of policy included in WHO's ten recommendations. For example, "1.1 Setting and enforcing speed limits appropriate to the function of each road" describes the law needed to regulate speed limits appropriate to the function of each road, while "4.2 Putting in place internationally recognized manufacturing standards" describes a standard needed. <sup>b</sup>The number of policies of each type identified in the review. For example, for "1.1 Setting and enforcing speed limits appropriate to the function of each road" "legal documents-law, there two laws related to "setting and enforcing speed limits appropriate to the function of each road" were identified. <sup>c</sup>Described the extent to which the intent of the recommendation is met where "fully" indicates the identified documents include content that completely meets the intent of the WHO recommendation; "partially" indicates the intent is somewhat covered, and "no" if no policy documents related this recommendation were identified. For example, the strategy "1.1 Setting and enforcing speed limits appropriate to the function of each road" was fully met by the two laws, three regulations and ministerial acts, and six executive and strategic policy documents. For the strategy "4.5 Promoting child restraint loan schemes and educating families on use of restraints", there are only two policy documents mentioning "Educating families on use of restraints" rather than "Promoting child restraint loan schemes".

Table 1: The number of policies corresponding to the WHO framework.

were primarily formulated by the Ministry of Public Security (52.9%). The Administration of Quality Supervision, Inspection and Quarantine issued the most standards (70%). All policy documents were developed by the State Council (45%) and its affiliated ministries and child affairs related organizations (55%) (Appendix 5). Among all policy documents, twelve (20%) were jointly formulated by multiple sectors and organizations.

Among the eligible policies, no legal documents were dedicated solely to child road safety. Two of the identified laws had a penalty focus on the general population, including children, providing road traffic rules and related crimes. One law stipulated children's rights and child protection, including the use of child restraint systems, but without penalty. Among the twenty regulations and ministerial acts, ten were related to road safety for the whole population, and the remaining were on school health and safety (5), emergency medical care and rehabilitation (3), urban lightning (1) and public security department administrative regulations (1), including content related to child road safety. Among the twenty standards, six were about vehicles, six were about road infrastructure, two were about child restraint systems, and others were about motorcycle helmets, bicycles, drink-driving, child reflective school uniforms, school bus and guidelines for road safety education for children. The majority of standards were mandatory (65%). Seven of the twenty-four strategic planning policy documents were the Five-Year Plans for road safety and work safety of the whole population (Appendix 6). The other strategic planning policy documents included transportation (6) and emergency medical care and health promotion (6), disability prevention (3), child development (1) and urban lighting (1). We only identified six executive documents specifically for child road safety. Eleven were related to health. The other thirty executive documents included road traffic for the whole population (7), urban planning (3), child safety (3), safety education in the community and in families (3), disability prevention (1), child development (1) and business (1).

Based on the Five-Year Plans, the content of eligible policies could be broadly divided into five stages reflecting changes in policy commitment on child road injury. In the first stage (2003–2005), the policies related to child road safety mainly consisted of legal documents, and the content mainly targeted road safety of the whole population, including drink-driving, speeding, helmets and road infrastructure. Few policies initially were explicitly aimed at children, focusing on increasing ability to see children in the road environment, supervision of children and school buses. In the second stage (2006–2010), road injury prevention became a priority of the national policy agenda of the Chinese central government, particularly in specific locations (schools) and road safety standards, such as the improvement of traffic infrastructure around schools, forming walking

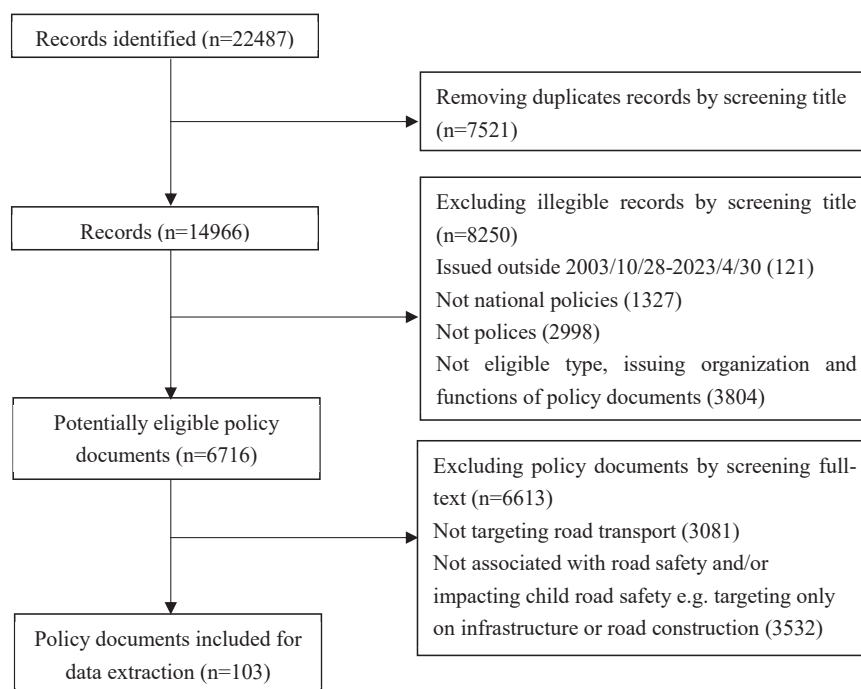


Fig. 1: The flow diagram of policy identification and search.

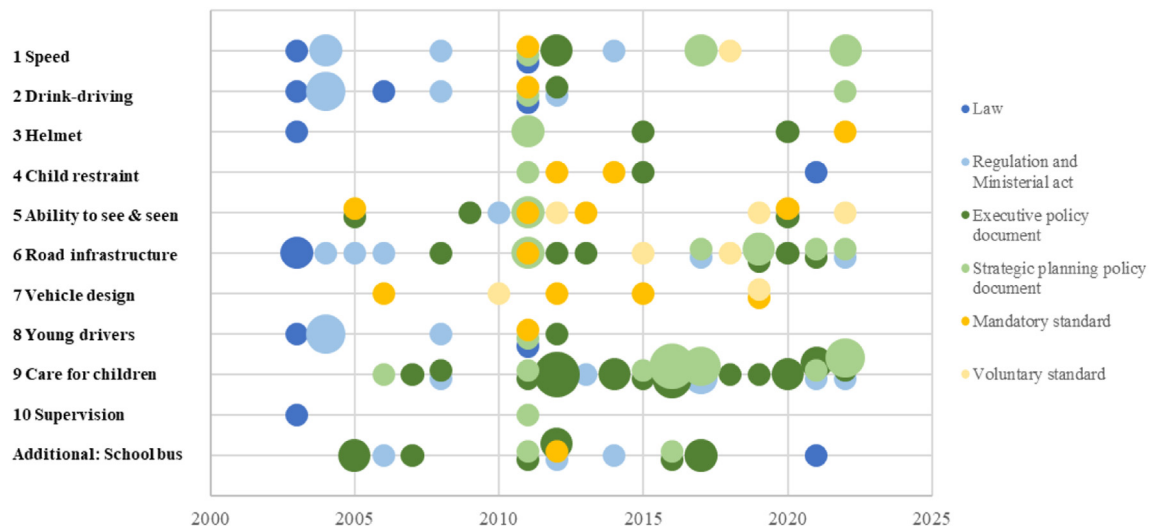
buses, the alleviation of school bus crashes, training teachers first-aid and improving standards for vehicle safety and street lighting, which was realized by formulating more regulations, policy documents and standards. In the third stage (2011–2015), many policy documents and standards related to child road safety were introduced and extended to child restraint system use, first aid, rehabilitation and mental healthcare of children injured in crashes. The fourth stage (2016–2020) was dominated by policy documents. Policy decision-makers at the national level shifted attention to the comprehensive establishment of essential components of road safety, such as increasing road users' safety awareness, and improving the safety of vehicles and roads, leading to an overall strengthening of child road safety policies through the road safety system. From 2021 to 2023, more content explicitly on child road safety appeared in new emerging policy documents and law amendments (Fig. 2).

Mapping the content of the identified policies to the ten primary strategies and secondary strategies of the WHO framework, all ten primary strategies have policy coverage in China. Of the forty-six secondary strategies recommended by WHO, thirty-six (80.4%) are fully covered by existing policies, three (6.5%) were partially covered, and six (13.0%) were not covered (Table 1).

Among the forty-six secondary strategies, eight require legislation to meet the intent of the strategy, including three for speeding, two for drink-driving, one

related to helmets, one related to child restraint systems, and one to vehicle design. All but one of these were fully covered. The exception was related to child restraints. Although a child protection law was recently amended to include the requirement of using child restraint systems, there is no associated requirement for enforcement and/or penalties in this law. The promising finding is the law on drinking and driving. The Blood Alcohol Content (BAC) standards for drinking and driving are even stricter in China (20 mg per 100 mL) than recommended by WHO (50 mg per 100 mL). Apart from legislation, two strategies require the formulation of product standards: helmets and child restraint systems. There are corresponding standards for both in China.

The remaining thirty-six secondary strategies require the development of policies. Among them, twenty-eight are fully covered by existing policies in China, one is partially covered, and six are not covered at all. In terms of reducing drinking and driving, although the law stipulates the age for drinking, there are no policies on the type and duration of alcohol sales. There is a lack of policies on child restraint system, on ensuring the accessibility and affordability of child restraint system, requiring private car manufacturers to install plug-in attachments, and promoting child restraint system loans; In terms of vehicle design, there is a lack of policies to encourage the installation of cameras, audible radars and alcohol interlock devices. There are no policies on restricting driving at night and taking



**Fig. 2:** The time distribution of policies in line with different strategies. The X axis represents time, and the Y axis represents the WHO framework plus school bus strategy. Dots represent policies issued at different time that conform to the eleven strategies. Different colors of dots represent different types of policies. The size of the dot represents the number of policies.

passengers for young drivers, and there is a lack of policies requiring emergency vehicles to be equipped with child-sized medical equipment.

Beyond those policies recommended in the WHO framework, some additional child road safety policies were identified. These focus on school bus safety with policies stipulating the obligations and responsibilities of schools and service providers to ensure the safety of school buses. These also clearly stipulate the maximum speed of school buses, prohibit overloading and prioritise the passage of school buses. In addition, mandatory standards have been formulated to ensure the safety performance of school buses.

## Discussion

The key finding of this in-depth review of policies impacting child road safety in China is that the ten primary and forty-six secondary strategies recommended by the WHO are covered in China to varying extents. In some cases, e.g. drink-driving, existing policies in China are more stringent than those recommended by the WHO. However, in other areas, such as enforcing child restraint system law or emergency vehicles to be equipped with child-appropriate medical equipment, there is scope to increase policy support for improved child road safety.

China has had laws restricting drink-driving and speeding for a long time, and while these remain common causes of road traffic injuries and deaths,<sup>15,16</sup> changes introduced to strengthen enforcement and impact of this on casualties is a good example of the potential importance of policies enacted to support law.

When these laws were first implemented in 2003, penalties were limited to economic punishment and short terms detention, and a violation was not considered a criminal offence. No obvious changes in drink-driving and speeding related casualties occurred following the introduction of these laws,<sup>15,16</sup> suggesting the penalties were not enough to deter these behaviours. In 2011, the penalties associated with these offences were strengthened so that serious drink-driving and speeding could be punished by detention for one to six months and be regarded as criminal acts. Subsequently, stricter legislation and enforcement have led to a significant decline in the number of accidents caused by drink-driving and speeding, reducing road traffic deaths among children.<sup>9</sup> The process of legislation and emendation observed in China could provide evidence and experience for other countries with similar situations.

Similar attention may be required to strengthening policy support for child restraint systems. Previous research shows that parents support the law for child restraint system use in developed cities in China,<sup>17</sup> yet rates of child restraint system use remain relatively low.<sup>17-19</sup> Surveys with parents in China suggest that many misunderstand the importance of restraints in reducing the risk of injury in a crash.<sup>17,20,21</sup> As recommended by WHO, further strengthening of policies to enable enforcement of child restraint system use laws might help increase the utilization rate. At the same time, introducing policies to assist compliance with laws might further help to increase utilization rates. For example policies supporting education efforts may help parents change their misunderstanding and policies aimed at improving access and affordability of child

restraint systems, such as through loan schemes.<sup>22,23</sup> More policies on child restraint system education could be a consideration for future policymaking.

We found good policy coverage in motorcycles and e-bikes, with standards covering the quality of helmets for all three vehicle types and laws precluding the use of motorcycles by children under the age of 12.<sup>24</sup> We judged the recommended WHO helmet policies to be fully covered assuming that the helmet standards in China that describe helmets by size meet the intention of the WHO strategy that recommends motorcycle helmet policies stipulate the type and fit of helmets by age. However, there may still be scope to improve current helmet standards in China as even though the head circumference range is from 500 to 660 mm and is divided into five categories covering most age groups, it may not be suitable for children under five years old.<sup>25</sup> This also highlights scope for better clarification of the WHO recommended strategies related to helmets to ensure jurisdictions following these recommendations take action to ensure optimal protection for children of all ages including infants.

Regarding vehicle safety design, the most common way for children to participate in road traffic in China is as pedestrians. Therefore, vehicle design related to protection of pedestrians is highly relevant to child road safety in China. Currently only voluntary vehicle standards exist related to pedestrian protection, however given the significance for children in China it might be important to mandate this standard.<sup>12</sup> There is also a lack of provision of medical equipment specially designed for the treatment of children in emergency vehicles. Addressing this policy deficiency would improve outcomes for children injured in crashes as it would allow for better first aid, treatment, and rehabilitation of children.<sup>26</sup>

We found a paucity of child road safety policies jointly formulated by multiple agencies. Increasing the number of joint policies could be beneficial in reducing costs and obstacles to effective policy implementation.<sup>27–29</sup> In the absence of increased joint development and policy release across multiple sectors, an alternative might be to promote the existing Joint Committee on Road Traffic Safety, a coordinating body for road safety in China, to a higher level within the government to enable better coordination between departments.

The increase in number and focus of policies related to child road safety over time demonstrates how road safety promotion in China has changed with time and conditions. With the first road safety law (2003–2005), while generally beneficial for both adults and children, policies targeted the general population,<sup>30</sup> and policies specifically targeting child road safety were rare until the second stage. With limited resources in the early stages of policy formulation, these child road safety policies primarily targeted schools where there are naturally

high concentrations of children. In the third stage (2011–2015), there was a rapid increase in quantity and expansion of child road safety policies which might reflect more attention from the government due to the development of the first independent Five-Year Plans for road safety that also occurred at this time. From 2016 to 2020, the focus shift likely reflects the Chinese central government's more mature thinking, design, and deployment of a comprehensive road safety system. The change of these policies over time suggests that under limited resource conditions, the government can gradually develop targeted policies based on the conditions.

### Limitation

As with any study, a few limitations should be kept in mind. First, only policies issued after the first road safety law was introduced were reviewed. While many road safety policies can be traced back to the 1950s, most of the content in these would be included in some form in included policies. Second, only data sources that could be searched and policies on public websites were included. This might impact policy documents, but not legal or standard documents. Third, this study focused on policies related to the WHO framework. Other policy areas beyond the WHO framework could impact child road safety, such as policies encouraging multimodal transportation such as public transport, walking, and cycling. As modal shifts are increasingly being seen as societal shifts that could benefit road safety, future work might benefit from greater inclusion of these issues in policy reviews related to road safety.

### Conclusion

In conclusion, this study provides an overall description of policies relevant to child road safety in China. China has many existing policies relevant to child road safety, and these cover the WHO framework to some extent and go beyond WHO recommendations in regulations related to drink driving and policies aimed at increasing school bus safety. However, by comparing the existing policy landscape with the WHO's recommended strategies for improving child road safety, specific areas with scope for further policy strengthening in China were identified. With the increasing growth of highway construction, car ownership, and the introduction of policies to encourage childbirth, there is increasing need for greater attention to child road safety and a more child-friendly traffic environment in China. The results of this review can guide where this attention could be best placed. Furthermore, this review provides a benchmarking example that other regional countries with interest in improving child road safety might use to identify priority areas for future action in their jurisdictions.

### Contributors

YJ and PY conceptualized the study and participated into the data analysis. YJ completed the first draft of the manuscript. MT contributed

to the study methodology. MP, RI, MT, LZ, SX and WC provided critical comments on drafts of the manuscript. LD and JB were responsible for manuscript review and the decision to submit the manuscript. All authors participated in the review of the manuscript, read and approved the final manuscript. The corresponding authors attest that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

#### Data sharing statement

All data analysed in this review are included in the main file and Additional files. The authors had full access to all the data in the study and had final responsibility to submit for publication.

#### Declaration of interests

We declare no competing interests.

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#### Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lanwpc.2024.101079>.

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