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Improper Usage of and Misunderstandings Regarding Child Seats

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1. Introduction

Although numbers of child fatalities and severe injuries due to automobile accidents has decreased in line with increases in child seat (hereinafter, “CRS”) usage rates, with the end of the COVID-19 pandemic, these numbers are gradually returning to pre-pandemic levels (see Fig. 1). Proper use of CRS significantly reduces the risk of harm, but their misuse is common.

Traffic accident statistics show that improper CRS usage increases fatality and severe injury rates by nearly 4 to 7 times (see Fig. 2). In addition to misuse, CRS are misunderstood in terms of the ages of children they should be used with and in which direction they should be installed. Here, I have attempted to summarize these misuses and misunderstandings.

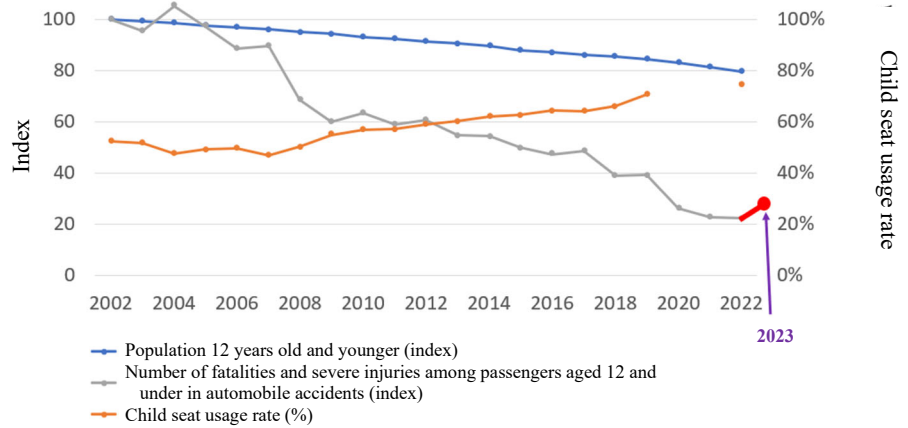


Fig. 1. Trends in the number of fatalities and severe injuries among passengers aged 12 and under in automobile accidents

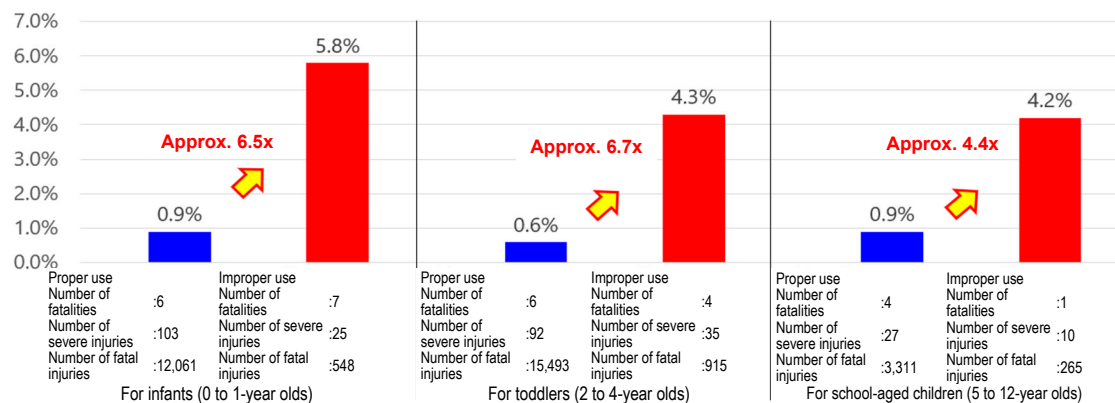


Fig. 2. Fatality and severe injury rates by CRS usage in automobile accidents (2013 to 2022)

2. CRS Misuse

2-1. Improper Installation

In this context, “improper installation” refers to when the seatbelt is not sufficiently tightened when securing the CRS. According to a nationwide survey conducted in 2023 by Japan’s National Police Agency and the Japan Automobile Federation (hereinafter, “JAF”)¹⁾, approximately 40% of infant and child CRS were improperly installed, with the majority of these cases involving insufficient seatbelt tightening. If an accident were to occur in this state, the CRS would move significantly within the vehicle, creating the risk of the child’s head or face striking interior structures such as the front seat, or the CRS itself colliding with other passengers, as shown in Figure 3²⁾.

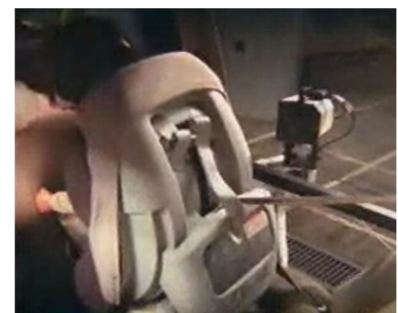


Fig. 3. Collision with improperly installed CRS²⁾

2-2. Improper Seating

Misuse also commonly occurs when seating a child in the CRS. In the previously mentioned nationwide survey conducted by the National Police Agency and JAF, improper seating occurred in over 50% of infant and child CRS, with the most common issue being insufficient tightening of the harness (the belt used to restrain the child in the CRS). As shown in Figure 4³⁾, if an accident occurs with an insufficiently tightened harness, the child may move forward significantly during the collision, possibly striking the front seat. Traffic accident statistics also show that such misuse increases the likelihood of head and facial injuries (see Fig. 5 and 6). This is thought to be due to improper installation or loose harnesses, which cause the child to move significantly during the accident, as shown in Figures 3 and 4, leading to the child's head or face striking interior structures such as the front seat.



Fig. 4. Collision when improperly seated³⁾

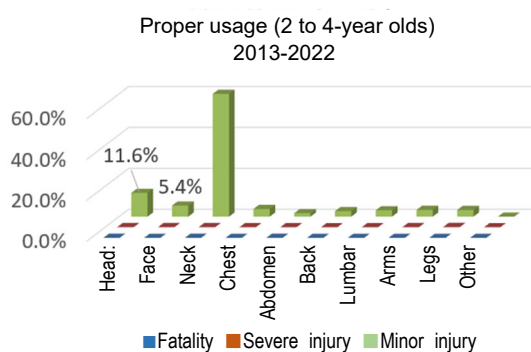


Fig. 5. Most severely injured body part (by percentage) during proper CRS use

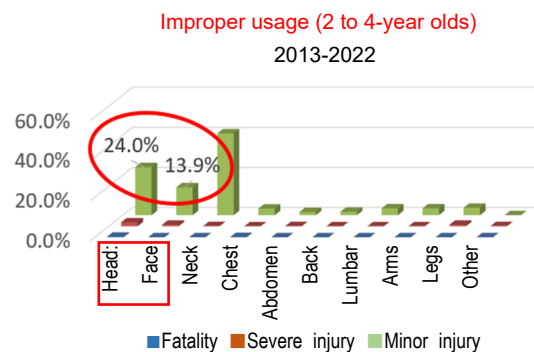


Fig. 6. Most severely injured body part (by percentage) during improper CRS use

2-3. Improper Use of the Passenger Seat for CRS

In the nationwide survey conducted by the National Police Agency and JAF, 123 children were seated in a CRS facing backwards in the passenger seat. As shown in Figures 7 and 8, if a frontal collision were to occur in this state, the force from airbag deployment could cause the CRS itself to be hurled, possibly causing serious harm to the child seated in it. Traffic accident statistics (see Fig. 9) show that in the case of CRS for infants aged 0 to 1 year old, head injuries rates are higher when the CRS installed in the front passenger seat than the rear seat, and there are concerns that fatalities and severe injuries with head trauma may involve injuries caused by the airbag.



Fig. 7. Before airbag deployment



Fig. 8. After airbag deployment

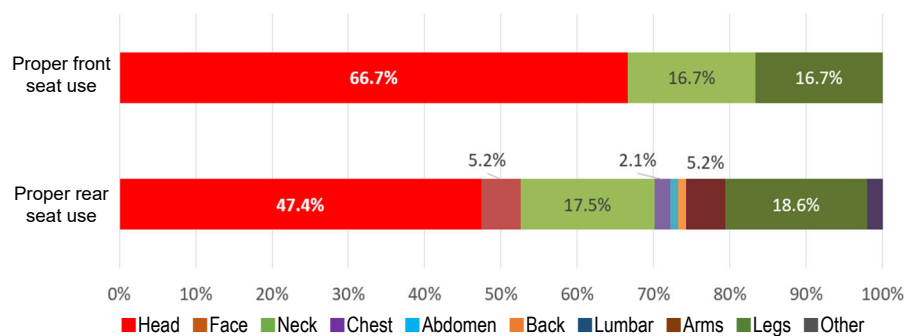


Fig. 9. Most severely injured body part (by percentage) when seated in an infant CRS (fatal and severe injuries among infants aged 0 to 1 year old between 2013 and 2022)

Some imported vehicles are equipped with a feature called an “airbag cut-off switch” that prevents the airbag from deploying even in the event of an accident. Although this enables CRS to be installed in the front passenger seat, because the switch is manually operated, there is a possibility that the driver may forget to turn the switch off.

Furthermore, as shown in Table 1, “Fatality and severe injury rates by seating position”, fatalities and severe injuries due to accidents are higher for the front passenger seat than for the rear seat, meaning it is preferable that child passengers, who need the most protection, be placed in the rear seat.

	Driver seat	Front passenger seat	Rear passenger seat
Number of fatalities and severe injuries	64,451	14,157	4,702
Number of casualties	2,604,095	464,816	230,267
Fatality/severe injury rate	2.5%	3.0%	2.0%

Table 1. Fatality and severe injury rates by seating position (Numbers of fatalities and severe injuries for all ages from 2013 to 2022)

3. Misunderstandings Regarding Child Seats

3-1. Misunderstandings Regarding the Usage Period of Booster Seats (CSR for School-aged Children)

Because Japan’s Road Traffic Act mandates the use of CSR for children under 6 years old, it is often mistakenly assumed that once a child turns 6, they can use car seatbelts. However, because car seatbelts do not properly fit a child until they are around 150 cm tall, children face the risk of injury to their neck or abdomen from the seatbelt in the event of an accident. Traffic accident statistics (see Fig. 10 and 11) show that among children aged 6 to 12 who died while wearing a 3-point seatbelt, the percentage of abdominal injuries as the most severely injured body part is more than 20 percentage points higher than in passengers aged 13 to 19. There is a possibility that these abdominal injuries are being caused by seatbelts. To prevent this, booster seats should be used until the seatbelt properly fits the child’s skeletal structure, such as the ribcage and hip bones.

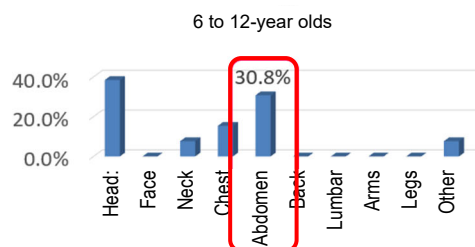


Fig. 10. Most severely injured body part (by percentage) among passengers (fatalities among 6 to 12 year olds) wearing seatbelts

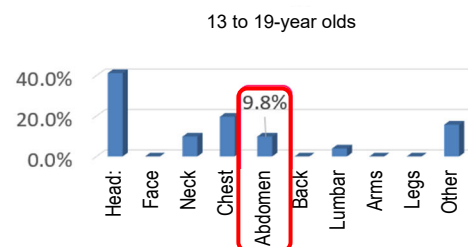


Fig. 11. Most severely injured body part (by percentage) among passengers (fatalities among 13 to 19 year olds) wearing seatbelts

3-2 Misunderstandings

Regarding When to Use

Forward-Facing CRS

Starting from September 2023, safety standards for CRS fully transitioned to a new set of standards with enhanced safety measures. CRS that comply with these new standards can be used in a forward-facing (toddler)

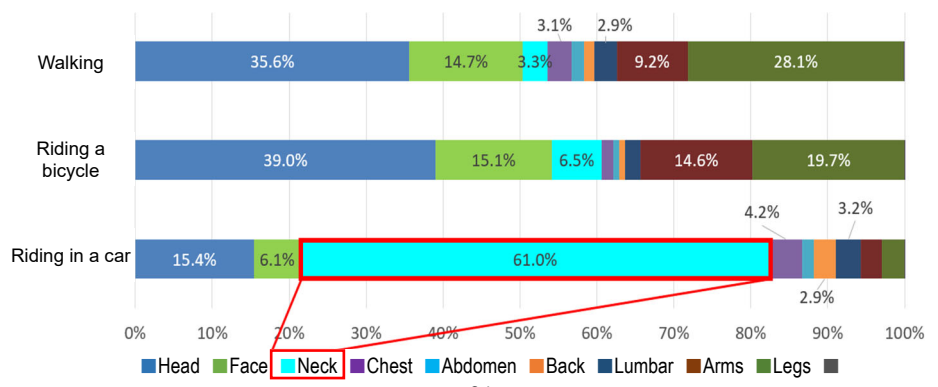


Fig. 12. Most severely injured body part (by percentage) among children aged 4 years or younger who were killed or injured in accident by circumstance (2013 to 2022)

position once the child is over 15 months old and reaches a height of 76 cm or more. However, some online information, such as that available from various public resources, states that "rear-facing (infant) CRS are to be used only until a child is 15 months old", which could lead users to mistakenly switch to forward-facing position at that age. Looking at Fig. 12, "Most severely injured body part (by percentage) among children aged 4 years or younger who were killed or injured in accident by circumstance", it can be seen that the percentage of neck injuries is extremely high while riding in a four-wheeled vehicle, and that using CRS in a rear-facing position for longer is likely to reduce neck injuries.

A UN-issued booklet introducing new CRS standards⁴⁾ states that, despite supporting a large and heavy head, infants have weak neck muscles, and should remain in a rear-facing CRS for as long as possible to reduce the risk of severe injury in the event of an accident. Furthermore, the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and the American Academy of Pediatrics recommend that the best way to ensure a child's safety in a car is to keep them rear-facing for as long as possible⁵⁾. Additionally, more than 20 U.S. states have made it mandatory for children to remain in a rear-facing seat until the age of two. The Japan Pediatric Society also bases its recommendations on the guidelines from the American Academy of Pediatrics⁶⁾. Based on this, we suggest that CRS suitable for both infants and toddlers should be used in a rear-facing position until at least the age of two.

4. Summary

4-1. Recommendations for Protecting Children Riding in Cars

Even when a CRS is used, improper installation, improper child seating, and improper use of the passenger seat may pose a risk of injury to the child's head or other body parts. To minimize harm to children while riding in a car, it is crucial to use CRS properly by following the instructions provided in its user manual.

While a CRS is legally mandated for children under 6 years old, when a seatbelt is used for 6 year-old children, the shoulder belt rests on their neck, while the lap belt crosses their abdomen. If an accident were to occur in this state, damage could be caused to the child's neck or abdomen, making it necessary to continue using a booster seat until the child's physique enables the seatbelt to properly align with their skeletal structure.

Finally, switching from a rear-facing CRS to a forward-facing CRS at too early a stage may pose a risk of neck injury to the child in the event of an accident, which is why a rear-facing CRS should be used for as long as possible.

We hope that these recommendations are undertaken to ensure the safety of children riding in cars.

4-2. ITARDA Initiatives

Cooperation and collaboration with relevant organizations is essential in preventing accidents involving child passengers. To this end, ITARDA collaborates on research initiatives with the National Research Institute of Police Science and JAF to promote increased CRS usage. Additionally, children involved in accidents may not always fully recover to their pre-accident state of health, even with treatment. This means that prevention is of utmost importance. For this reason, ITARDA has begun activities in collaboration with medical institutions—primarily obstetrics and pediatrics—aimed at raising awareness of accident prevention. Because there are limits to ITARDA's outreach, we also make efforts to raise awareness by providing information to newspapers, parenting magazines, and online media. In the future, we also plan to provide information to public health nurses, as they frequently interact with pregnant women and are able to pass on necessary information to expectant mothers. ITARDA is dedicated to continuing its work together in cooperation with such related organizations in order to prevent accidents

for children who are the future of Japan.

<References/Sources>

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- 3) National Traffic Safety and Environment Laboratory Forum 2018, “The Impact of Child Car Seat Usage on Injuries to Child Passengers”
- 4) UN Regulation No 129: Increasing the safety of children in vehicles - For policymakers and concerned citizens (2016)
- 5) National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT). “Final-rule-FMVSS-213a-side-impact-child-restraint-systems”.
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- 6) Recommendations from The Japan Pediatric Society’s Children's Well-Being Committee on Safe Travel by Car – In the Case of Children, The Journal of The Japan Pediatric Society. 2008, Volume 112, Issue 6, Pages 60-72.

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