Misuse of booster cushions among children and adults in Shanghai—an observational and attitude study during buckling up

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\textbf{ABSTRACT}

\textbf{Objective}: Traffic crashes are one of the leading causes of fatalities among Chinese children. Booster cushion usage in China is low, and there are no studies showing how a population with limited experience handles booster cushions during buckling up. The purpose of this study was to evaluate the handling of and explore the attitudes toward booster cushions among children, parents, and grandparents in Shanghai.

\textbf{Methods}: An observational study including a convenience sample of 254 children aged 4–12 years was conducted in 2 passenger cars at a shopping center in Shanghai. Parents, grandparents, or the children themselves buckled up the child on 2 types of booster cushions, a 2-stage integrated booster cushion (IBC) and an aftermarket booster cushion (BC). The test participants were observed during buckling up, first without and then with instructions. The test leaders conducted structured interviews.

\textbf{Results}: Ninety-eight percent of the uninstructed participants failed to buckle up without identified misuse on the aftermarket booster cushion and 31% of those uninstructed on the integrated booster cushion. The majority of misuse was severe, including placing the belt behind the arm and the lap belt routing above the guiding loops. Instruction reduced misuse to 58% (BC) and 12% (IBC), respectively, and, in particular, severe misuse. Some misuse was related to limited knowledge of how to buckle up on the booster cushion, and some misuse was intentional in order to reduce discomfort.

The participants, both children and adults, reported that they preferred the IBC due to good comfort and convenience. Safety was reported as the main reason for adults using booster cushions in general, whereas children reported comfort as the most important motivation.

\textbf{Conclusions}: Education is needed to ensure frequent and correct use of booster cushions in China and to raise safety awareness among children and adults. Furthermore, it is important that the booster cushions offer intuitively correct usage to a population with limited experience of booster cushions.

This is the first study published on the handling of and attitude toward booster cushions after child restraints laws were introduced in Shanghai 2014.

\textbf{Introduction}

The number of passenger vehicles has tripled over the last 10 years in China, resulting in the world's largest car market together with the United States (Traffic Management Bureau of the Public Security Ministry 2014). During 2004–2008, 56,218 children aged 1–20 years died in road traffic crashes, accounting for 12.4% of all road traffic fatalities (Zhang et al. 2011). However, these figures are based on police reports and have been shown to be underreported by as much as half (Hu et al. 2011). The World Health Organization (2015) estimated that 261,367 people died in road crashes in China 2013, but the Ministry of Public Security reported that road traffic fatalities were 58,539 (Traffic Management Bureau of the Public Security Ministry 2014). Road traffic crashes are one of the leading causes of fatalities among Chinese children (Wang 2013). Hence, a better understanding is needed of how to improve vehicular child safety in China.

Crash safety for children relies on the correct usage of appropriate child restraints for their size, age, and weight. For older children, 4–8 years of age, booster cushions effectively reduce the risk of injuries by as much as 45% (Arbogast et al. 2009). However, to achieve good protection, the booster cushion must be used correctly. Misuse has been reported as a common problem (Koppel and Charlton 2009; Mathieu et al. 2014; O’Neil et al. 2009) resulting in increased injury risk to the abdomen, spine, and head (Winston et al. 2000).

Since 1993, Chinese law requires seat belts to be available in front seats of vehicles and since 2004, in rear seats as well. Regulations require that the seat belt should be worn where available. There is currently no national law for child restraint system (CRS) usage. However, some cities have local regulations. In Shanghai, the location for this study, a regulation effective since March 2014 states that children under the age of 12 must be seated in the rear seat and that children under the age of 4 must use a CRS when traveling in a family car (Traffic Management Bureau of the Public Security Ministry, 2014). Few have studied CRS usage in China. Routley et al. (2008) examined patterns for seat belt usage including children in 2...
Chinese cities. They observed that only 5% of children (<9 years) wore seat belts; no CRS was used; and the majority (54%) were rear-seated. Pan et al. (2011) observed car occupants at toll-gates in Shanghai and found that only 2.2% of the observed children were restrained in a CRS. Purc-Stephenson et al. (2010) investigated the attitudes toward CRS among parents in Beijing and found that the most common reasons for nonusage of CRS included difficulty in finding CRS, cost, and a preference for holding the child. The above studies explored restraint usage and attitude parameters, but none have focused on the handling of booster cushions in a population with limited experience of booster cushions.

The purpose of this study was to evaluate the handling of and explore the attitudes regarding booster cushions among children, parents, and grandparents in Shanghai. Two concepts of booster cushions were included in the study: an integrated booster cushion (IBC) and an aftermarket booster cushion (BC).

Method

The observational study took place at the entrance of a large shopping square in Shanghai during 2 weekends. The test leaders approached families walking by the square and asked for their participation. Children aged 4–12 and their parent or grandparent were presented with 2 types of booster cushions for evaluation: a 2-stage integrated booster cushion (IBC) and an aftermarket booster cushion (BC; see Figure 1). Grandparents were included in the study, because they have a great influence on children's nurturing in China (Nystrom and Ringedal 2014). The tests were performed in 2 Volvo XC60s, on both sides of the rear seat. Both the IBC and the BC were installed correctly in the car before the test was started. Before the study, all children and their parents or grandparents were informed orally about the test procedure and the possibility of stopping the test whenever desired. They also received the same information written afterwards, together with a small gift to the children. Each child tried the 2 booster cushions twice, in random order, first without instructions and then again after being instructed on how to buckle up correctly. The child sometimes buckled up by her- or himself and sometimes by the parent or grandparent. The test participants (children and adults) were chosen by convenience, among families with children in the right age group and given that they were willing to participate. The detailed test protocol is available in Appendix A2 (see online supplement).

Data collection

Nine Chinese test leaders collected the data consisting of structured interviews, observations, photos (frontal and lateral views), measurements of the child's height, and the time needed to buckle up. The child's height was measured, including shoes, and was used to determine the stage of the IBC (<135 cm on the highest stage; all other children were seated on the lowest stage). Four children were taller than 150 cm, but they still had good belt fit when restrained on the booster cushions and were therefore included in the study. No children were tested without booster cushions. The test leader adjusted the correct height of the IBC.

The structured interviews consisted of 3 parts conducted by the test leader before, during, and after buckling up. The questionnaire is available in Appendix A3 (see online supplement). Before testing, questions concerned the child's age and gender and the adult's and child's safety behavior and experience (e.g., seat belt/booster cushion usage and experience of booster cushion/buckling up). During testing, participants were asked how they perceived buckling up; afterwards the child and adult were asked which booster cushion they preferred, why, and what would make them use or not use a booster cushion in general. All questions were multiple-choice (except for age). They were allowed to choose more than one option and to add their own answer concerning what would make them use a booster cushion or not. Some questions were directed specifically to the children and some to the adults. A limited pilot study with adults was conducted in order to adjust the questions and answers to the structured interview.

Observations were made to evaluate frequency and type of misuse. The separation of minor and severe misuse was based on previous studies, testing, and engineering judgement (Bilston et al. 2007; Gotschall et al. 1997). Severe misuse included wrong belt routing around the lap belt guiding loops, a necessary feature to attach the BC to the vehicle and also to control the belt geometry. The belt guides can also be used as armrest. Minor misuse included a twisted belt and shoulder belt (SB) above the inner guiding loop (if it resulted in the SB being too close to the neck). Severe misuse included the lap belt (LB) above one or 2 guiding loops, SB behind the back or under the outer arm, excessive slack, and other (SB behind the head, LB under the buttocks, and SB above the inner arm; see Figure A1, online supplement). All misuse was coded separately, meaning that one test could have more than one case of misuse. If both severe and minor
misuse occurred in one test, the overall classification of the test was severe misuse. Digital photos were used to document misuse in order to validate the test leader’s observations afterwards and to estimate belt slack (>5 cm = misuse).

Time for buckling up was measured from the moment the participant grabbed the belt with one hand until the belt tongue clicked into the buckle. If the child was not buckled up within 90 s, the test participant was interrupted and the test was excluded. Each test took approximately 15 min.

Data analysis
Student’s t test and the Clopper-Pearson interval test (95% confidence interval) were used in the analysis to determine the significant differences. The number of failed tests was compared between the 2 different booster cushions. The time required to complete the belt donning process was compared between the BC and IBC. Within each booster condition, the time required for adults to buckle up a child was compared with the time children required on their own. Note that this is a between-participant comparison, because each child either donned the belt him- or herself or had a caregiver put the belt on it.

Results
A total of 254 children, 4–12 years, were included in the study. Of these, 17 cases were excluded for each booster cushion in the handling analysis, due to missing pictures. Two cases for each booster cushion were excluded due to the test participant’s failing to buckle up within 90 s. In the attitude study, some questions were left unanswered due to the sometimes stressful test situation for the test leaders and sometimes because the youngest children had difficulties responding to the questions. The response rate is defined for each question.

The characteristics of the children and adults are outlined in Table 1. The distribution of children was equal between genders. Test participants (those buckling up the child) were divided as follows: 59% children, 37% parents, and 4% grandparents. Almost all participants owned their own vehicle, traveled by car at least weekly, and had a child sitting in the rear seat. More than 70% of the adults reported that they always used a seat belt, whereas only 26% of the children reported they did so. Between one quarter and one half of the children in each age group sometimes buckled up by themselves. Less than 4% of the children reported that they used a booster cushion regularly, and 65% of the adults and 84% of the children reported that they had never seen a booster cushion before.

Handling
Rate of misuse
For the BC, 98% of the test participants failed to buckle up without identified misuse, compared to 31% for the IBC. After instructions, the corresponding figures were 58 and 12%, respectively (Figure 2). The misuse rate was significantly higher for the BC compared to the IBC, both before and after test participants had been instructed on how to buckle up correctly ($P < .05$, Student’s t test). The majority of failed tests prior to instruction were due to severe misuse. After instruction, severe misuse decreased from 94 to 34% for the BC and from 20 to 5% for the IBC. In several tests, more than one case of misuse occurred. There were 3.3 misuse modes per failed test for the BC and 1.2 misuse modes per failed test for the IBC.

Type of misuse
The most frequent misuses prior to instruction were with the SB and LB above the guiding loops for the BC and a twisted belt and

| Table 1. Characteristics of children and the test participants (the person buckling up the child). |
|---|---|---|---|---|---|---|
| Variable | n | % | Variable | n | % | |
| Age (buckled up by themselves/by adult/total) | 4 | 7/24/31 | 5/23/12 | Typical seating position | 4 | 2 |
| 5 | 26/33/59 | 17/32/23 | Rear seat | 242 | 95 |
| 6 | 22/17/44 | 18/16/17 | Equally front/rear seat | 8 | 3 |
| 7 | 18/17/35 | 12/16/14 | Seen a booster cushion (child/adult) | Yes | 41/88 | 16/35 |
| 8 | 20/6/26 | 13/6/10 | No | 211/164 | 83/65 |
| 9 | 17/4/21 | 11/4/8 | Not reported | 2/1 | 0 |
| 10 | 19/1/20 | 13/1/8 | Restraint usage: seat belt (child) | Always | 54 | 21 |
| 11 | 9/0/9 | 6/0/4 | Almost always | 13 | 5 |
| 12 | 6/0/6 | 4/0/2 | Sometimes | 48 | 19 |
| Not reported | 1/2/3 | 1/2/1 | Almost never | 51 | 20 |
| Participants | Children | 150 | 59 | Never | 88 | 35 |
| | Parents | 94 | 37 | | | |
| | Grandparents | 10 | 4 | | | |
| Own a family car | Yes | 236 | 93 | Restraint usage: booster cushion | Always | 7 | 3 |
| | No | 17 | 7 | | | |
| | Not reported | 1 | 0 | Almost always | 2 | 1 |
| Traveling behavior | Daily | 150 | 59 | Sometimes | 7 | 3 |
| | Weekly | 96 | 38 | Almost never | 21 | 9 |
| | Monthly | 6 | 2 | Never | 214 | 84 |
| | Very seldom/never | 2 | 1 | | | |
| Rate of misuse | | | | | | |

misuse occurred in one test, the overall classification of the test was severe misuse. Digital photos were used to document misuse in order to validate the test leader’s observations afterwards and to estimate belt slack (>5 cm = misuse).

Time for buckling up was measured from the moment the participant grabbed the belt with one hand until the belt tongue clicked into the buckle. If the child was not buckled up within 90 s, the test participant was interrupted and the test was excluded. Each test took approximately 15 min.
shoulder belt under the arm for the IBC (Table 2). After being instructed, all types of misuse decreased for the IBC. For the BC, the occurrence of belt slack almost doubled (24 compared to 42 tests), whereas misuse with the guiding loops and other types of misuse decreased. If comparing the rate of misuse between children buckling up themselves and adults buckling up the child, it could be seen that children had more comfort-related misuse (SB behind the head, under the arm, or behind the back; \( P = .011 \)) compared to adults.

**Table 2.** Amount of misuse in percentage, by user, booster cushion, and before and after instruction. Each valid test may have more than one misuse.

| Misuse Type                  | Before instructions | After instructions |
|------------------------------|---------------------|--------------------|
|                              | Child | Adult | Total | Child | Adult | Total | Child | Adult | Total |
| Inner LB above guide         | NA    | NA    | NA    | 94    | 85    | 91    | NA    | NA    | NA    |
| Outer LB above guide         | NA    | NA    | NA    | 92    | 69    | 82    | NA    | NA    | NA    |
| SB above guide               | NA    | NA    | NA    | 78    | 95    | 85    | NA    | NA    | NA    |
| Twisted belt                 | 20    | 9     | 16    | 29    | 20    | 25    | 11    | 3     | 8     |
| SB behind back               | 5     | 0     | 3     | 6     | 1     | 4     | 1     | 0     | 0     |
| SB under arm                 | 10    | 5     | 8     | 9     | 13    | 11    | 2     | 0     | 1     |
| Belt slack                   | 2     | 5     | 3     | 3     | 20    | 10    | 2     | 3     | 3     |
| Other                        | 8     | 4     | 6     | 3     | 5     | 4     | 1     | 0     | 0     |
| No. of valid tests           | 138   | 97    | 235   | 143   | 102   | 245   | 125   | 91    | 216   |

**Table 3.** Average and median times for buckling up (correct/all), before and after instructions.

|           | Average (sec) | Median (sec) | No. of tests |
|-----------|---------------|--------------|--------------|
| IBC before| 14.0/14.0     | 11.0/12.0    | 86/129       |
| Adults    | 10.7/9.2      | 8.0/8.0      | 79/93        |
| Total     | 12.4/12.2     | 9.0/10.0     | 165/222      |
| IBC after | 13.0/12.6     | 10.0/10.0    | 124/129      |
| Adults    | 13.5/9.6      | 7.5/7.0      | 90/93        |
| Total     | 12.5/11.6     | 10.0/10.0    | 214/222      |
| BC before | 13.5/18.8     | 10.0/15.0    | 41/129       |
| Adults    | —/—3.2        | —/—10.0      | 0/93         |
| Total     | 13.5/16.5     | 10.0/12.0    | 42/22        |
| BC after  | 21.9/23.5     | 20.0/21.0    | 93/129       |
| Adults    | 17.9/17.2     | 15.0/14.0    | 55/93        |
| Total     | 20.5/20.8     | 18.0/18.5    | 148/222      |

**Time**

Before being instructed, only 4 participants succeeded in buckling up without identified misuse on the BC; hence, the mean values for this case are excluded from analysis. For test participants succeeding in buckling up without identified misuse in all tests, the average time after being instructed was significantly shorter for the IBC (mean = 12.5 s) than for the BC (mean = 20.5 s), tested with Clopper-Pearson interval test (\( P < .0001 \); Table 3).

Adults buckled up faster than the children buckled up themselves on both booster cushions (IBC: \( P = .0187 \); BC: \( P = .0381 \)), but there was no significant difference before and after instruction (\( P = .47 \)).

Comparing all participants, regardless of the presence of misuse, it took a longer time to buckle up on the BC after being instructed compared to before instructions (adults: \( P < .001 \); children: \( P < .001 \)). For the IBC, the situation was the opposite for children (\( P = .0469 \)), but there was no significant difference for adults (\( P = .300 \)).

**Perception**

The IBC was generally considered easier to handle by the participants than the BC, and the BC was considered even more difficult to handle after instructions (Figure 3). Although many participants answered that it was easy to buckle up, none did it correctly on the BC before instructions, but almost 80% buckled up without identified misuse on the IBC. This result is based on 127/120 (IBC/BC) tests before instruction and 106/118 tests after instruction.

**Attitude**

Both the children and their parents/grandparents were asked which booster cushion they preferred and why. More than 60% of the children and almost 75% of the adults preferred the IBC. Approximately 30 and 22% respectively preferred the BC. The children’s main reasons for choosing the IBC concerned comfort (\( n = 42 \)) and ease in buckling up (\( n = 21 \)). The most frequent
reason for adults (n = 99) to choose the IBC was convenience. The second most frequent argument was that it took no space (n = 26). For the BC, both children and adults stated that they preferred it because it seemed safer (n = 11/12) and was more comfortable (n = 24/11). The results are presented in Table 4. For both children and adults, safety was an important aspect in combination with comfort. A dominating reason for not using a booster cushion was that they were unaccustomed to it. Insufficient knowledge was the most frequent argument in the other adult category.

**Discussion**

This study explored the buckling up of children on 2 different types of booster cushions in terms of misuse and participant attitudes to the booster cushions in the study and booster cushions in general.

**Handling**

Almost all participants (98%) failed to buckle up without identified misuse on the aftermarket booster cushion, whereas the misuse rate for the IBC was 31%. The difference in misuse levels and types of misuse between the 2 types of BC can be partly explained by design differences. The IBC is integrated with the vehicle, thus eliminating the need for guiding loops. The BC requires guiding loops in order to attach the BC to the vehicle in the event of a crash (preventing the BC from slipping forward, resulting in submarining of the child) and to ensure correct shoulder and lap belt fit. However, the majority of test participants had never before seen or used an aftermarket booster cushion, and the design with guiding loops may not have been intuitive for inexperienced users.

After instructions, given both orally and with pictures of correct belt use, misuse decreased from 98 to 57% for the BC and from 31 to 13% for the IBC. Severe misuse was particularly reduced. The experience of booster cushions was limited among participants; the majority of children and adults had never seen a booster cushion, and less than 4% used a booster cushion regularly. This was in the same range as other studies; Purc-Stephenson et al. (2010) found a BC usage of 5% among children 5–8 years. Pan et al. (2012) found CRS or BC usage of about 2% in the age group 0–12 years. Broad campaigns and education programs are needed to reach Chinese families. In the United States and Europe, the BC has been used for decades, and many campaigns have been carried out, but the misuse level ranges between 41 and 65% (Mathieu et al. 2014; O’Neil et al. 2009). However, education and campaigns may not be the only solutions to the misuse problem. In a study by Osvalder and Bohman (2008), Swedish children (4–12 years) with previous experience of BC usage could buckle up with limited misuse on an IBC (4%) compared to a traditional aftermarket booster cushion (77%). The results in this Chinese study are in line with the previous Swedish study, indicating that a minimum of misuse can be achieved by designing the booster cushion for intuitive use.

Some misuse could be addressed as a discomfort problem. Common severe misuse for both booster cushions was by placing the shoulder belt under the arm or behind the back. It was more common among children than adults. Some test participants’ motivation was to increase shoulder belt comfort by avoiding chafing of the belt against the neck. This category of discomfort could be addressed by developing the vehicle belt geometry together with the booster cushion to ensure proper belt fit.

Time to buckle up was significantly shorter for the IBC compared to the BC. Because the IBC does not require belt routing around the guiding loops, handling was much quicker. Convenience is an important factor motivating BC usage (Bingham et al. 2006; Osvalder and Bohman 2008); therefore, design facilitating usage is desirable. Furthermore, when participants were instructed on how to buckle up correctly, the time to buckle up increased for the BC, indicating the complexity of buckling up on the BC.

Many users stated that it was easy to buckle up on the aftermarket booster cushion, yet the majority failed to buckle up without identified misuse. Until the test leader told them otherwise, they believed that they had buckled up correctly. After instructions, a greater number of test participants found the BC more difficult to handle due to the guiding loops but this was
not the case for the IBC. Several participants were not sure that they had managed to buckle up correctly on the BC. Some were convinced that they had buckled up correctly the second time, but there was still some misuse. In addition, belt slack increased as the participants followed instructions and tried to route the shoulder and lap belt correctly under the guiding loops.

Attitude

This study also explored the attitude of the tested booster cushions in addition to booster cushion use in general.

The majority of test participants preferred the IBC to the BC, due to comfort and easy handling. Adults also acknowledged the limited size of the IBC compared to the BC. In China, it is common for several generations (child, parents, and grandparents) to live together and hence to also travel together. Therefore, a trim design of a booster cushion is desired. For participants preferring the BC, safety and comfort were the main reasons.

When exploring attitudes in general, the most commonly reported reasons for children to use booster cushions were comfort, safety, and the possibility to see out. Adults’ most commonly reported reasons were safety, more control of the child, and the possibility for the child to see out. In an American study, Bingham et al. (2006) found similar reasons among adults for booster cushion use. The participants in the current study may have ranked “safety” high, because they were asked the questions in questionnaire after receiving information on how to buckle up correctly. On the other hand, the adults in the study reported high seat belt usage, indicating high safety awareness.

Few children or adults found laws or their enforcement good reasons for booster cushion usage. However, several studies in other countries have shown that both laws and their enforcement increase the usage of booster cushions (Bingham et al. 2006; Eichelberger et al. 2012; Simniceanu et al. 2014).

The most common reasons reported among children for not using a BC included “not used to it,” discomfort, and other reasons, such as “no access,” “unstable,” “don’t like it,” “difficult to handle,” and “cannot sleep on it.” Among the adults, the most common reasons were “not used to it,” “takes a lot of space,” and other reasons, such as “limited knowledge,” “the child is old enough,” “drive slowly,” “short distance,” “no accident will occur,” “no access,” “sitting together with an adult,” and “wear and tear to the seat bench.” None of the participants mentioned nonusage arguments such as booster cushions are childish, which has been found in other studies in other countries (Edwards et al. 2006; Jakobsson et al. 2007). One reason may be the lack of experience with booster cushions.

A majority of reasons for nonusage for both children and adults point to the importance of increasing awareness of child safety in cars. The results also highlight the importance of offering products that are easy to handle and comfortable. These are important steps to take in order to increase the usage of booster cushions in China and thereby reduce the number of severely injured children and child fatalities. There are only a few vehicles offering integrated booster cushions in China, the United States, and Europe. For most vehicles, caregivers need to buy a separate add-on solution to be able to transport their children safely.

Limitations

Most children in the study (93%) were in a family with a car, and the majority (97%) reported that they traveled in the vehicle at least once a week. In 2014, approximately 25% of Chinese families owned a car (Traffic Management Bureau of the Public Security Ministry 2014). Furthermore, the high percentage (95%) of children seated in the rear seat may be a result of new laws in Shanghai from 2014. Other studies (Pan et al. 2011; Routley et al. 2008) showing lower numbers may be due to the studies being carried out before these regulations came into effect. Therefore, the test participants in this study may not be representative of the average Chinese family countrywide. However, the participants represent the group of Shanghai families with access to a car who drive it regularly.

The assessment of misuse severity was based on published studies as well as the authors’ experience. This estimate can be improved by further validation of the misuse conditions in crash tests.

Furthermore, seat belt usage varies in China, depending on region. In this study, seat belt usage among adults was reported as 75%, which is a reasonably high number and may have influenced the answers on attitude. The high seat belt usage also provides test participants with good experience of buckling up, compared to other regions in China, which may facilitate buckling up the child on a booster cushion. If the study had been conducted in other regions in China, more misuse may have been detected.

A more equal distribution between test participant groups (children, parents, and grandparents) would have been preferred but was not obtained in this convenience test sample. In this shopping center, it was mainly parents and their children visiting; not many grandparents were present. In future studies, grandparents should be included to a greater extent, because they play an important role in Chinese children’s lives.

This study focused on the buckling up phase of the 2 different booster cushions. To obtain a more complete evaluation of the handling of booster cushions, future studies should include the installation of the booster cushions, such as IBC when folding/unfolding the 2 stages. Furthermore, driving studies reveal that comfort is an important aspect of booster cushion use.

This study only included 2 types of booster cushions, and in future studies booster seats (high-back booster cushions) should also be evaluated in terms of handling, installation, and attitude.

The majority of test participants, children and adults, had never seen a booster cushion before, and only 4% of the children used a booster cushion regularly.

Almost all test participants (98%) failed to buckle up without identified misuse on the aftermarket booster cushion without instruction, compared to 31% for the IBC. The majority of misuse was graded as severe. Instructions decreased misuse to 58% (BC) and 12% (IBC). The IBC was faster and easier to use compared to the aftermarket booster cushion due to its more intuitive design.

The IBC was the most preferred booster cushion among both children and adults due to comfort and convenience. Safety was the main reasons for adults to use booster cushions in general, whereas children rated comfort as the most important motivation.
Education is needed to ensure frequent and correct use of booster cushions in China and to raise safety awareness among children and adults. Furthermore, it is important that booster cushions offer intuitive correct usage and comfort for a population with limited experience of booster cushions.

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