

## ORIGINAL ARTICLE

## DRIVERS' KNOWLEDGE AND ATTITUDES TOWARDS CHILD RESTRAINT SYSTEM (CRS) USAGE

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## ABSTRACT

Child restraint system (CRS) can protect children in the event of crash and reduce the severity of injuries. As such, it is crucial to understand the prevalence of CRS usage and knowledge attributes on CRS usage among drivers. This study aims to assess drivers' knowledge on CRS usage. A semi-structured questionnaire was developed and pilot tested to verify its validity and reliability. The questionnaire addresses drivers' knowledge about CRS currently available in the Malaysian market, the types of restraints used and views on fitting restraints to passenger vehicles. Seventy four percent from 500 respondents cited that they are using or they have used CRS, 64% know about CRS and its function, and 43% are aware of ISOFIX. In short, majority of the respondents are aware of CRS use and functions. Awareness and education program should be rigorously introduced to public towards the implementation of the CRS law.

**Keywords:** Child restraint system, children passenger safety, road traffic accident, child injury

## INTRODUCTION

Road traffic accidents are the major cause of injuries and fatality among children younger than 15 years old<sup>1,2</sup>. Children, whose body structure are still developing, are much more at risk to severe injury. Their age, in particular, is correlated with muscular development and ossification of the cervical spine<sup>3,4</sup>. Children age 2 to 5 years' old who is restrained in the adult seat belt are three and half times more likely to suffer a serious injury and more than four times more likely to suffer a serious head injury, than children of the same ages who use child restraint system (CRS)<sup>5</sup>. Furthermore, with the current adult seat belt design, it is impossible to restrain children ages 0-3 years old without CRS and often times, parents take alternative means to transport their children unrestrained. Additionally, unrestrained children are 1.6 to 5.4 times higher risk of fatal injury than those restrained in a CRS<sup>6</sup> and head injuries are common as compared to other body parts<sup>7</sup>. CRS is designed specifically to limit and protect children from injury that could lead to fatality in car crashes as well as to cater the limitation of seat belt capability<sup>8</sup>.

Most developed countries such as Australia, Sweden and Europe have mandated the CRS use. Specifically, three countries in ASEAN region that have specific laws requiring the usage of CRS are Brunei, Cambodia and Singapore. Malaysia plans to introduce the CRS law in 2019 as part of its road safety improvement initiative<sup>9,10</sup>. It is a common sight on Malaysian roads where children are transported using motor vehicle without CRS or unrestrained. A study conducted in Malacca found that 27.4% of car drivers possess at least one CRS<sup>11</sup>. Similarly, an observation in Kajang showed that only 9.5% children were seated in

CRS<sup>12</sup>. Media news reporting ejection or throw-out of vehicles cases involving children were many, possibly due to restraint issues<sup>13,14</sup>. Elsewhere, it was highlighted that improper or incorrect use of CRS was quite prevalent<sup>15,16</sup>. The most common forms of misuse include CRS placed on the front passenger seat which was equipped with passenger airbag<sup>12</sup>, loose safety belt attachment and harness strap errors<sup>17,18</sup>. Incorrectly restrained children were 7 times riskier to sustain severe injuries (injury severity score (ISS) more than 15) than those restrained correctly<sup>4</sup>. Incorrect CRS used was reported to have 10.5 times and 6.8 times greater proportion of head and spinal injuries, respectively<sup>4</sup>. In brief, correct installation, harnessing and appropriate size are considered crucial for CRS to be effective. Considering the authority's plan to mandate CRS in the near future, this paper attempts to assess drivers' knowledge and practice on CRS usage towards CRS law implementation.

## METHODOLOGY

A cross-sectional self-administered survey was carried out among drivers who have children aged below 11 years old. The study was carried out at selected shopping malls and supermarkets in the state of Selangor and Malacca between January 3<sup>rd</sup> to April 30<sup>th</sup>, 2016. These states were selected as it is located at the central region of Peninsular Malaysia. Verbal consent was sought from each respondent prior to handing out the survey form.

Self-administered semi-structured questionnaire was established by the review of the literature<sup>19,20,21</sup> and translated into Malay language. It comprised of three parts: 1) socio-

demographic, 2) parental knowledge in CRS usage and 3) belief. The survey questions addressed drivers' knowledge about the CRS availability in the market and their experience with CRS. Images of CRS type were included in the survey form to assist respondents understanding.

Socio-demographic information collected included age, educational level and household income. Performance on the parental knowledge was assessed according to the number of correct answers on the function of items related to CRS. A further set of question consisted of 7 statements was designed to gauge drivers' opinions and knowledge about restraining children to the CRS. Drivers were asked to demonstrate the extent to which they agree or disagree with each statement on a 5-point Likert scale ("Strongly disagree" to "Strongly agree"). Of the total 7 questions, 4 items were on the injury risk (e.g., "CRS prevent severe injury or death in a crash"; "Unsuitable CRS may cause injury in a crash"), 2 items related to compliance issue (e.g., "I agree on CRS law implementation"), and 1 item on ease of CRS installation. The content and face validity of the questionnaire was established through experts'

review to ensure relevant domains were included. The questionnaire then underwent several pilot tests among target groups of 50 drivers to identify potential questions that may be unsuitable or difficult to comprehend. Several questions that were unclear and redundant were either rephrased or removed. The reliability score of the revised questionnaire by Cronbach's alpha test was 0.852.

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 17.0 software. The demographic data of the entire group were evaluated by calculating the means and standard deviations (S.D.) for continuous variables and proportions for categorical values. Results are expressed with 95% confidence interval with *p*-value <0.05 was considered as statistically significant. Performance on the knowledge-based survey was evaluated according to the number of accurate answers.

**RESULTS**

A total of 500 respondents contributed in the survey and the demographics are as shown in Table 1.

*Table 1 - Drivers demographics (n=500)*

| Variables                             | Frequency | Percentage, % |
|---------------------------------------|-----------|---------------|
| <b>Guardians Age</b>                  |           |               |
| <=25                                  | 43        | 8.6           |
| 26-35                                 | 237       | 47.4          |
| 36-45                                 | 160       | 32.0          |
| >45                                   | 60        | 12.0          |
| <b>Guardians Gender</b>               |           |               |
| Male                                  | 213       | 42.6          |
| Female                                | 287       | 57.4          |
| <b>Relationship with the children</b> |           |               |
| Mother                                | 236       | 47.2          |
| Father                                | 171       | 34.2          |
| Guardian                              | 93        | 18.6          |
| <b>No of children stay together</b>   |           |               |
| 1                                     | 231       | 46.2          |
| 2                                     | 128       | 25.6          |
| 3                                     | 98        | 19.6          |
| 4                                     | 30        | 6.0           |
| >=5                                   | 12        | 2.6           |
| <b>Education level</b>                |           |               |
| Never go to school                    | 10        | 2.0           |
| UPSR                                  | 13        | 2.6           |
| PMR-lower highschool                  | 12        | 2.4           |
| SPM-upper highschool                  | 133       | 26.6          |
| Diploma/Certificate                   | 176       | 35.2          |
| Degree Holder                         | 156       | 31.2          |
| <b>Household income</b>               |           |               |
| <RM3,000                              | 147       | 29.4          |
| RM3,001-RM5,000                       | 197       | 39.4          |
| RM5,001-RM10,000                      | 124       | 24.8          |
| >RM10,000                             | 32        | 6.4           |

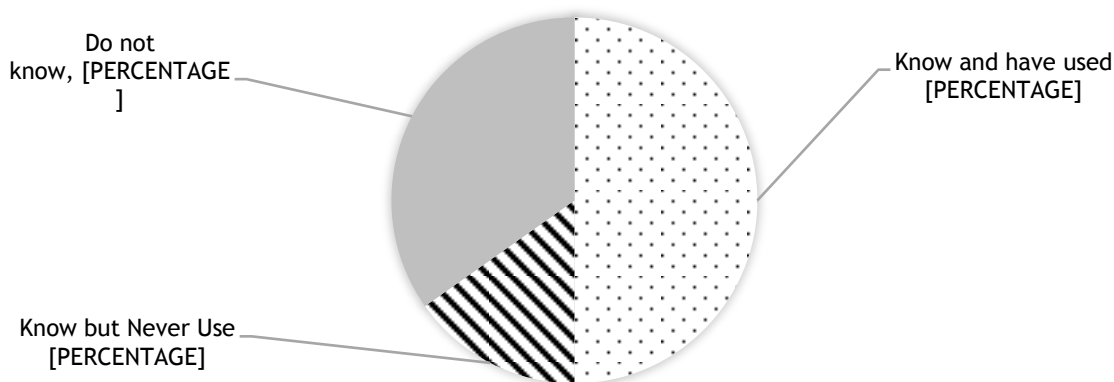
The average age of the respondents was 35.5 years old, with the minimum age was 18 years old and the maximum was 60 years old (mode = 30 YO, S.D. = 8.18). More than half of the respondents (57.4%) were female. The level of education of the respondents were mostly at Diploma or Certificate level. Majority of the respondents reported monthly household incomes in the second lower incomes group, between RM3,001 to RM5,000 (39.4%).

Respondents were queried on three items related to CRS, namely CRS device,

internationally universal CRS fixture system (ISOFIX) and airbag warning sign, as shown in Table 2. Almost all of them had seen CRS, except 2 persons. Among them, 65.2% know the function of CRS. For the ISOFIX attachment system, only 43.8% drivers had seen it and 52.5% of them had used it. On the other hand, 75.8% of respondents had seen the airbag warning label in a car and half of them know that the label is to warn drivers from putting their child on a front passenger seat equipped with airbags.

**Table2 - General knowledge on CRS**

| Item                | Have seen | Know the function | Have used |
|---------------------|-----------|-------------------|-----------|
| CRS                 | 99.6%     | 65.2%             | 74.3%     |
| ISOFIX system       | 43.8%     | 64.8%             | 52.5%     |
| Airbag warning sign | 75.8%     | 41.6%             | 50%       |



**Figure 1 - CRS knowledge and usage rate**

Figure 1 illustrates the CRS knowledge and usage rate. It was determined that 50% of the respondents (n:250) know the function of CRS and have used them, 15% (n:76) of them know but have never used it. Thirty five percent did not know the function of CRS; among them, 24% have used CRS but misinterpreted the correct CRS function.

Table 3 illustrates the bivariate analysis on the significance between drivers' characteristics and CRS usage. This study recorded the overall rate of CRS use of 41.8% (n=209). Drivers

demographics, namely, age, relationship with the children, education level and household income show significant attributes towards CRS usage. There is a direct relationship between the drivers' age, relationship with the children and monthly income with the CRS use as shown in Figure 2. Among all respondents, there is a significant relationship between CRS use and drivers' age ( $p=0.002$ ). Additionally, driver relationships to the children (i.e. mother, father or guardian) and household income were found to be statistically significant ( $p<0.001$ ,  $p<0.05$ ).

**Table3 - Bivariate analysis on the correlation of CRS usage with drivers' characteristics**

| Variables                      | Chi-square | p-value | Significance with CRS usage ( $p<0.05$ ) |
|--------------------------------|------------|---------|--|
| Age                            | 20.58      | 0.002   | Yes                                      |
| Gender                         | 1.50       | 0.473   | No                                       |
| Relationship with the children | 20.48      | <0.001  | Yes                                      |
| Number of children             | 2.165      | 0.904   | No                                       |
| Education level                | 17.70      | 0.006   | Yes                                      |
| Monthly household income       | 13.88      | 0.031   | Yes                                      |

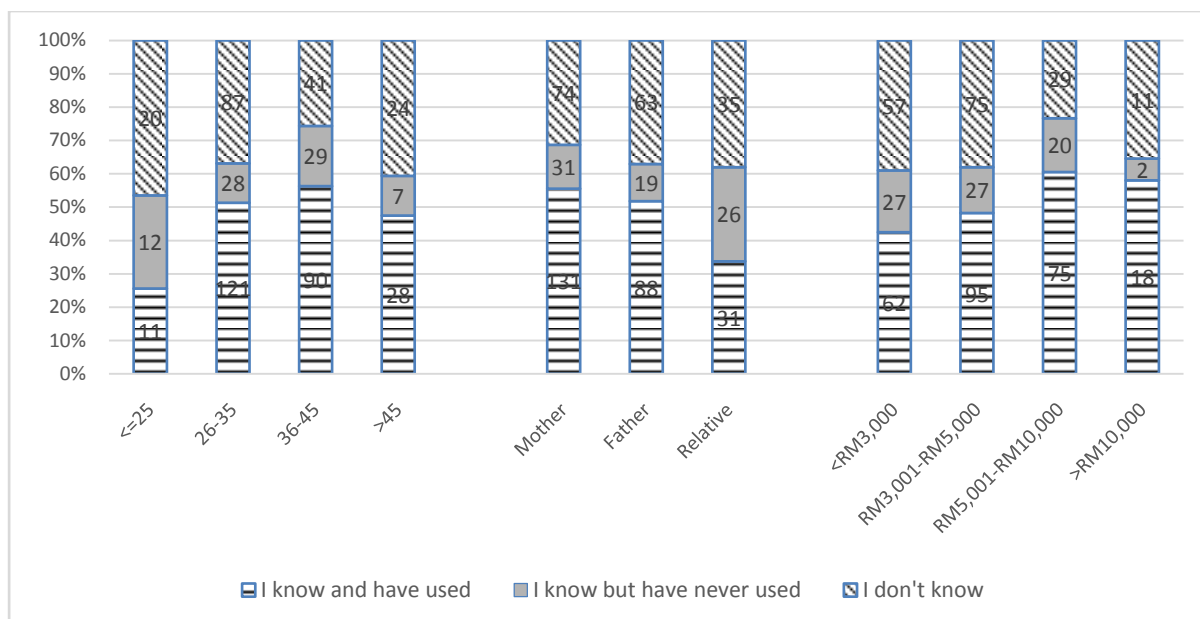


Figure 2 - Relationship between CRS use and drivers' demographics

Respondents were asked to rate their level of agreement with statements about CRS. Items and response rates of agreement and disagreement are displayed in Table 4 (neutral value was not included in the table). About 22% did not agree to CRS law implementation. Most respondents (74.8%) agreed that CRS could protect their children by reducing injury and prevent death in a crash. Similarly, 68.6% of respondents indicated “Strongly Agree” that misuse of CRS may lead to severe injury in a crash.

When it came to deeper aspects of protection provided by the CRS, agreement was slightly weak. Fifty eight percent respondents indicated “Strongly Agree” when asked about whether unsuitable CRS may cause injury in a crash. Fifty seven percent disagreed that passenger airbag may cause severe injury in a crash. More than 50% of the respondents thought CRS is easy to install (57% “Strongly Agree”). Most drivers seem to disagree on implementation of CRS law in Malaysia.

Table 4 - Drivers' belief in relation to their use of CRS and the protection offered by them

| Item  | Strongly agree | Strongly disagree |
|---|----------------|-------------------|
| <i>Protection issue</i>                                   |                |                   |
| CRS prevent severe injury or death in a crash             | 374 (74.8%)    | 11 (2.2%)         |
| Unsuitable CRS may cause injury in a crash                | 292 (58.4%)    | 38 (7.6%)         |
| Misuse of CRS may cause severe injury in a crash          | 343 (68.6%)    | 25 (5.0%)         |
| Front seat with airbag may cause severe injury in a crash | 288 (57.6%)    | 66 (13.2%)        |
| <i>Compliance issue</i>                                   |                |                   |
| Agree on CRS law implementation                           | 171 (34.2%)    | 110 (22.0%)       |
| Will buy CRS according to children size                   | 200 (40.0%)    | 84 (16.8%)        |
| CRS is easy to install                                    | 286 (57.0%)    | 26 (5.2%)         |

**DISCUSSION**

The respondents in majority possessed either a diploma or higher academic qualifications (66.4%). Higher qualifications are directly related to the household income profile<sup>22</sup>. Higher academic corresponds to better knowledge or awareness on CRS<sup>23</sup>. Thus, it is possible that they have greater sense of responsibility to keep children safe during travel, thus explaining the strongly agree decision (74.8%).

The majority of the drivers reported the monthly household income of lower than RM5000 which is equivalent to RM60k annually. The CRS price in Malaysian market is approximately around RM500, with this in mind, low-income families may feel burdensome to obtain the CRS. Considering the high price of CRS, parents may try to find an alternative to protect the child during travelling. One of the options is to get a secondhand CRS. This secondhand CRS are easily available in online market. However, there are some disadvantages to own the secondhand CRS such as no history records on the CRS usage. For

example, the secondhand CRS may have been involved in an accident thus its performance may be affected and the buyer did not know about this. Since it is very important in parents' perception on buying new CRS, NGO's and government could assist these family in providing more CRS rental services and provide assistance such as funding to increase the usage of appropriate CRS.

Almost all respondents were knowledgeable and aware of CRS availability for children and almost two-third (74.3%) had prior experience using CRS. However only 65% knows how CRS functions thus possibly indicating that a small fraction of them may have superficial understanding. Drivers' lack of knowledge on the function and benefit of CRS may lead to frequent misuse<sup>23,24</sup>. With respect to ISOFIX, relatively lower number of respondents have either seen or encountered the device/system even though more respondents know the function. One possible explanation is that the ISOFIX system is somewhat hidden in the car backseat and often times not visually available especially if drivers were using conventional type CRS (utilizing seatbelt rather than ISOFIX). Besides, ISOFIX in most cars, especially entry models, were only recently available in almost all variants. For airbag warning sign, it was interesting to see that only two-third of respondents (75.8%) have seen the symbol although higher rate was expected, at least similar to CRS awareness.

The effectiveness of CRS has been numerously proven to minimize the number of child fatality in road accidents<sup>5,8,25,26</sup>. Age- and size-appropriate of CRS use help in reducing the fatality risk up to 54% among toddlers and 71% among infants<sup>25</sup>. This study suggests that children safety can be enhanced by improving the parental knowledge and understanding on how to choose the 'best size' of CRS, how to install CRS correctly and the position to put their children in the car. The collaboration of public education program and enforcement program could successfully increase the usage of CRS<sup>27,28</sup>.

Nevertheless, CRS importance has been highlighted via ASEAN CAP program since 2012, not only in Malaysia but covered ASEAN region. The ASEAN NCAP child occupant protection ratings, in a way, has forced car manufacturers to integrate child safety seats directly into their vehicle's design. This in return, could promote safer car for consumer especially for children restrained by CRS. Most drivers including parents obtained source of information on CRS commonly by self-learning via media electronic and printed<sup>29</sup>. A study in Malaysia reported that only 5% of drivers seek advice from professional doctors and nurses<sup>30</sup>. There is a strong perception on CRS is easy to install. However, there is a study reported that among drivers who

see the installation of CRS is an easy task, installed it incorrectly<sup>31</sup>.

## RECOMMENDATION

Medical professional especially doctors and nurses should be more proactive in advising and delivering the right message to drivers, especially parents and their children on the benefits of CRS use. Similarly, education and information transfer on proper use of CRS may be given in another setting such as maternity wards, child care settings, community-based organizations, driving school and point of sale locations.

## LIMITATION

These result need to be viewed in light of the limitation of the study, it is entirely based upon driversself-proclaim rather than direct observation. That explains the higher CRS usage rate relative to the actual situation (4%)<sup>10</sup>. In addition, due to the selection of the study area, the findings from this study may not be generalizable to the wider rural population of drivers.

## CONCLUSION

Considering the result of this study whereby drivers' knowledge level was at medium level, educational intervention for drivers on CRS use are urgently needed. In particular, drivers need to be exposed and educate on how to choose the best size for their children, how to install the CRS correctly and how not to misuse the CRS. Since the government is making mandatory use of CRS in 2019, child safety and CRS use is recommended to be introduced as a new element in Malaysian driving curriculum for new driver. Apart from that, the CRS information and importance can be explained and advised by CRS sales promoter or car dealer during purchasing process. Car dealer may help the government by explaining on the usage of CRS and safety equipment in the car that related to the CRS usage. In addition, new challenges on purchase of used CRS need to be further studied to ensure its performance in protecting children.

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