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Investigate The Level of Technical Knowledge of Adults Towards Children Restraint System at Batu Pahat

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Abstract: Accident rates in Malaysia are among the highest in Southeast Asia. Therefore, the Malaysian government has decided to make it mandatory for all types of vehicles to install a child safety seat or child restraint system (CRS) starting January 1st, 2020. The installation of this CRS is mandatory for vehicle owners with children under 11 years old. The main function of this CRS is to reduce the impact of strong vibration during accidents. To ensure that this system is able to act effectively and efficiently, this CRS has been divided into several types according to age, seat position in the vehicle, child weight and child height. Therefore, all vehicle owners should take into account several important factors to maximize the effectiveness of the system. This study was conducted to determine the level of technical knowledge of adults related to CRS and also to investigate the relationship between their levels of technical knowledge related to this system with the selection of the correct type of CRS. The selection factor of this system is very important because it can affects the level of injury suffered by children during accidents. A total of 382 adults age 18 and above were selected around Batu Pahat. The results of the study found that the level of technical knowledge of users related to CRS is high in which the average value of the score is 3.7148. The results of the Chi-square test found that the level of technical knowledge of the respondents related to CRS affects the selection of the correct type of CRS with the value of $\chi^2 = 163.875$.

Keywords: Accident, Children Restraint System (CRS), Technical Knowledge, Adults, Batu Pahat.

1. Introduction

In Malaysia, there are two types of transportation that are commonly used which is private and public transportation. However, people in Malaysia are more likely to use private vehicles compare to public

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transportation services. This can be proved by the increasing demand for the private vehicles ownership [1]. The urban cities in Malaysia which has shown the increase demand for the private vehicles ownership is such as Kuala Lumpur, Penang, Johor Bahru, Kuching and Kota Kinabalu [2]. The factor which led to the increasing of private vehicle rate is due to the expanding economy since 1987. Due to the Malaysia economic shows a positive trend, it enable most of the people to afford their own vehicles.

Therefore, the increasing rate of private vehicles in Malaysia will be the major issue which it will may affect the number of car accidents. Therefore, the safety aspect for the private vehicles must be considered especially the safety of the children. It is because the tendency for the children to experience serious injuries during an accident are higher than adults [3]. According to the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF), the total of fatality resulted from road accidents which involving children is more than 49,000 around the world. This number is accounted for 50% from the total cases of car accidents in the world [4].

2. Literature Review

The main purpose of CRS was introduced and designed is to improve the children safety or to prevent them from serious injury during road accidents. It is due to the fact that infants or children are unsuited to car seat belt use, which are more relevant in term of protection for adults [5]. According to the previous study on the effectiveness of CRS, it has proved that CRS can decrease the risk for the children to get serious injury during the road accidents especially to the infants which is less than 1 year old [6]. It is because the infants are different from adults in many elements such as anatomic proportion, bone maturity, and the location of vital organs [7]. The anatomic proportion is refer to the body proportion. In fact, human body proportion it can be classified into several ratio that is 1 to 8 body ratio. In general, not everyone have complete this type of body ratio. For infant and children, usually, they have relatively bigger head. As they growing up, their body will increase in height, but their head will not grow as much [7].

Therefore, it is very important for the user to select the right CRS models according to their children age and size. By using the correct selection of CRS, it can protect the children by reduce the possibility of children to suffer head injury during the crash. CRS can function as reducing the impact of children with the solid object during the crash by reducing the impact time. According to the previous study that conducted in Norway, it stated that, the total head injuries that suffer by the vehicle occupants is almost 60%. From the results, the researcher concluded that the rear passengers are likely to get more serious injuries compare to passenger at back seat [8].

During the crash or road accidents, a car occupant include the children which is without restraint will remain continue in moving at the same momentum at which the vehicle was travelling before the collision. Therefore, the chances of the occupants to catapulted forward into the structure of the vehicles are higher. Thus, in this cases, the CRS will act to avoid the occupant to catapulted forward especially the occupant in rear seat. CRS can also prevent the passenger to fully ejected from the vehicle during the collision. According to the American College of Emergency Physicians, about 75% of vehicle occupants was ejected from the vehicles during the crash which caused a death [9].

Therefore, appropriate use of CRS is compulsory to all users. The other functions of CRS is that it can protect and avoid young children during a sudden stop by restraining their movement away from the vehicles structure. Besides that, CRS also able to distribute the total forces of a crash over the strongest part of the body and it can avoid serious damage to the soft tissues [10].

As a conclusion, parents need to have enough knowledge about CRS to ensure the effectiveness of this system. For the additional information, all the users (e.g. parents) need to know what are the several types of crash during road accidents. It is important for them to determine which type of CRS that suitable for their children based on the standard guideline [10].

3. Methodology

The research design is a compulsory part before the research is carried out. According to the study that have been conducted by [11], research design is refer to complete structure of work procedure to collect the data. Besides that, [11] also stated that by a good and clear research design, it can help to reduce the effect of error variance. Therefore, research design will help to smooth the data collection process and data analysis process.

Other than that, [12] stated that a good research design is considered a several aspect such as clearly explain about research objective, scope and introduce the research organization.

This research applied quantitative method in order to identify the level of technical knowledge among adults towards Children Restraint System (CRS) in Batu Pahat and explore the relationship between technical knowledge among adults and the choice of CRS types. The respondents were adults which is 18 years old and above who resided in Batu Pahat District in Johor. Questionnaire instrument through Google Form was used in this research to obtain the data. Relevant statistical software such as Statistical Package for the Social Science Software version 23.0 was used to analyse the data.

3.1 Research Design

By using the frequency method, descriptive statistical analysis was conducted on nominal data which involves gender, age, marital status and education status. The results from the analysis was display in the form of percentage.

According to [13], descriptive statistics was used to identify the specific characteristics of the data in the analysis. Other than that, they also stated that this method can provide a simple summary of the study sample. This method also form the basis of virtually every quantitative analysis of the data together with simple graphic analysis. Beyond that, descriptive statistics also used to include the objective explanation in a concise way. It also might provide a number of steps in a research report and used to calculate a huge amounts of individuals by some calculation. The most important advantage by using this analysis method is it will enable the researcher to interpret large number quantity of the data in a rational way [13].

3.2 Mean Score

For this part (Section C : Technical Knowledge level toward CRS use), analysis was made by using a mean score method. The range for the mean score is shown in Table 3.1 to identify the level of technical knowledge among adults towards CRS in Batu Pahat. The range for the mean score was divided into two categories which are high and low [14].

According to [13], mean is one of the method of central tendency distribution which is used to estimate the average or centre of distribution of values. The formula which is use in this method is add up the total mean and divided with the number of total quantity. The 5 Likert scale are indicated with the different value from 1 to 5 (Strongly disagree, disagree, neutral, agree, strongly agree).

Table 3. 1 :Range of mean score

Range mean score	Level
3.67 - 5.00	High
1.00 - 3.66	Low

3.3 Chi-Square Test

The real function of Chi-Square test in this study was used to determine the relationships between categorical variables. The null hypothesis of the Chi-Square test is that no relationship exists on the categorical variables in the population. In the other word, they are independent (Sweet and Grace, 1999) Therefore, this Chi-Square test is used to determine either there is any significance relationship between technical knowledge level among adults' towards type of CRS use.

For this study the hypothesis was designed such as below before perform the Chi-Square test :

Ho : There is no significance relationship between technical knowledge level among adults' and the choice of correct CRS type.

Ha : There is significance relationship between technical knowledge level among adults' and the choice of correct CRS type.

The significance level that assumed for this study is ȧ equal to 0.05.

4. Results and Discussion

Before the questionnaire that is used for the study can be distributed to the respondents, it is very important to conduct a pilot study to test the level of reliability of the questions that have been constructed. To conduct the pilot study, the total sample that is used must be 10% of the sample projected [15]. Therefore, 38 respondents has been selected to be a sample for the pilot study. The main function of pilot study is to determine the Cronbach's alpha value for three sections of questionnaire that is use for this study, which includes section B (Respondents' Awareness towards Importance of CRS), section C (Respondents' Technical Knowledge Towards CRS) and section D (Respondents' Perception Towards The Usage of CRS). Therefore, there are three results of Cronbach's alpha value for every section.

In this study, the acceptable Cronbach's Alpha value must more than 0.700 which assumed as reliable value. The results in Table 4. *1*, Table 4.2 and Table 4.3 shows the results of reliability test for respondents' awareness towards importance of CRS (Section B), respondents' technical knowledge towards CRS (Section C) and respondents' perception towards the usage of CRS (Section D).

Table 4. 1 : Reliability test results for section B
(Respondents' Awareness towards Importance of CRS)

Cronbach's Alpha	N of Items
.890	7

The total number of questions in section B is 7 questions (or items). The results for Cronbach's alpha value for section B is 0.890. According to [16], the value of 0.890 is assumed as good value.

Table 4.2 : Reliability test results for Section C
(Respondents' technical knowledge towards CRS)

Cronbach's Alpha	N of Items
.923	12

The results in **Table 4.*2*** shows the result of reliability test for respondents' technical knowledge towards CRS questions (Section C). The total questionnaire that includes in section C is 12 questions (items). Based on the analysis of reliability test, the results of Cronbach's alpha value for section C is 0.923. Therefore, the Cronbach's alpha value in section C is an excellent value [15].

Table 4.3 : Reliability test results for Section D
(Respondents' perception towards the usage of CRS)

Cronbach's Alpha	N of Items
.764	2

The results in **Table 4.***3* shows the results of reliability test for respondents' perception towards CRS (section D). Based on the analysis results of reliability statistics, the Cronbach's alpha value for section D is 0.764. The total questionnaire (items) includes in section D is 2.Therefore, the Cronbach's alpha value in section D is acceptable. Since all the Cronbach's alpha value is 0.600 and above which is acceptable value [16], therefore, it can be concluded that all the questions for all sections can be used for data collection.

4.1 Data and Analysis

The purpose of this questionnaire distributed to the respondents is to answer objective 1 and objective 2 of the study. The first objective is to identify the level of technical knowledge of respondents on CRS. Meanwhile, the second objective is to find out the relationship between the respondents' level of technical knowledge of CRS and the selection of the correct type of CRS. A total of 382 questionnaires were distributed to respondents around Batu Pahat areas through Google Form online platform. This questionnaire is divided into 4 parts, namely part A is related to the demographic information of the respondents, part B is related to the respondents 'awareness of CRS, part C is related to the technical knowledge of the respondents to CRS and part B is related to the respondents' perception towards CRS.

4.1.1 Age of The Respondent

In this study, the age of the respondents was divided into several categories. There are 4 age categories involved, namely respondents aged 18 to 25 years (young adults), 26 to 40 years (adults), 41 to 60 years (middle-age adults) and over 60 years and above (elderly). **Figure 4.***1* shows the age distribution of the respondents involved in this study.
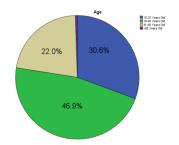

Figure 4.1 :Age of the respondent

Referring to the findings of the data, the total number of respondents aged 18 to 25 years is 117 people representing 30.6% of the total number of respondents. Meanwhile, for the respondents who are in the age category of 26 to 40 years is 179 people who represent 46.9% of the total respondents. For the age of respondents who are in the age category 41 to 60 years is 84 people which represents 22% of the total respondents. The age category of respondents 61 years and above is only 2 people which is equivalent to 0.5%. Therefore, most of the respondents in this study is in adults category.

4.1.2 Gender of The Respondent

As for gender in **Figure 4. *2***, the total number of female involved in this study is 186 which is 48.7% of the total respondents, while the total number of male respondents is equal to 196 which is 51.3% of the total respondents.
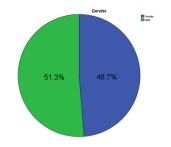

Figure 4. 2 : Gender of the respondent

4.1.3 Education of The Respondent

In this study, the background of the respondents' level of education has also been studied. There are several categories of level of education in this study, namely Sijil Pelajaran Malaysia (SPM), Diploma, Bachelor Degree, Master and Doctor of Philosophy. The following are the data related to the level of education of the respondents involved in this study. The data shown in Figure 4.3 is the data educational background of the respondents.
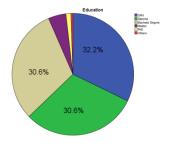

Figure 4.3 :Education of the respondent

Based on the data, there are 123 respondents with the educational background of SPM. The total number of respondents with educational background of SPM is represent 32.2% from the total respondents.

In addition, the respondents with educational background up to diploma are 117 people. This number is equivalent to 30.6% of the total number of respondents for this study. For the category of education level for bachelor's degree, there are 117 respondents who have the following level of education. That number is equivalent to 30.6% of the total number of respondents.

Other than that, for category of respondents who have an educational background up to the doctor of philosophy is 5 people and is equivalent to 1.3% of the total number of respondents. For other education other than the category mentioned in this questionnaire, there are 2 respondents who voted for this category which is equivalent to 0.5%.

4.1.4 Marital Status

In this study there are 2 types of marital status categories that was analyzed in this section, namely single or married. **Figure 4.*4*** shows the data that have been obtained from this study.
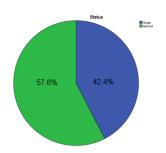
Figure 4.4 : Marital status

According to the data above, the number of respondents who are single is 162 and equivalent to 42.4%. Besides that, the total number of respondents who are married is 220 and it is equivalent to 57.6%.

4.2 Determine Respondents' Technical Knowledge Level towards CRS

To answer the question in objective 1, it is very important to obtain the data related to the level of technical knowledge of the respondents on CRS. Therefore, respondents were asked to answer questions related to technical knowledge in section C. The questions in section C are in the form of a 5-Likert scale. There are 12 total questions provided in section C. Therefore, the data obtained was analyzed in this section. The following are the findings of the study that has been obtained (**Table 4. 4**).

Table 4. 4 : Data for technical knowledge of the respondents on CRS

Questionnaire Section C (Respondents Technical Knowledge)	Mean
Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4= Agree, 5=Strongly agree	
1) Do you think that improper installation or use of CRS will affect head injury severity? (Schroeder, 2018)	3.6859
2) Do you think that it is dangerous if the children travelling with you without the uses of CRS? (Schroeder, 2018)	3.7251
3) Do you think that the CRS which is placed at the back seat will minimize the impact during crash occurs? (Schroeder, 2018)	3.6414
4) Do you think that the use of CRS will increase the safety of the children in the vehicle? (Torfs, 2016)	3.8089
5) Do you think that comfort of children in the CRS should be considered?	3.7723
6) Do you think that inappropriate use of CRS can cause the other injury? (Schroeder, 2018)e.g: Chest injury,leg injury, etc	3.7120
7) Do you think that the total maximum number of CRS in the vehicle is depends on the number of vehicle seat?	3.7723
8) Do you think that road accidents in Malaysia become the top factor that cause fatality among children?	3.4712
9) Do you think that the legislation of the use of CRS in Malaysia can be fully implemented by the public?	3.4424
10) Do you think a suitable programme should be organized by the government to increase the awareness about the important of CRS among adult?	3.8272

11) Do you think that the parent has responsibilities to reduce the number of fatality among the children during crash?	3.8848
12) Do you think that government should has responsibilities to reduce the total number of children fatality that involve in road accident?	3.8613
Mean Score for Section C (Respondents' technical knowledge towards CRS)	3.7148

Table 4. *4* shows the results of the mean score for every question in Section C (Respondents' technical knowledge towards CRS). There are 12 questions in section C that have been analyzed. The lowest mean score in section C is question number 9 with 3.4424 . The question number 9 is *" do you think that the legislation of the use of CRS in Malaysia can be fully implemented by the public?".* From the result, it shows that most of the respondents have less confident about the effectiveness of the implementation of the mandatory use of CRS in Malaysia. In other words, the public acceptance on the CRS use policy in Malaysia may be low.

Other than that, the highest mean score in Section C is question number 11 which is 3.8848. The question number 11 is *"Do you think that the parent has responsibility to reduce the number of fatality among the children during crash?".* Therefore, it shows that most of the respondents are highly aware on the children safety during a trip in a vehicle.

4.3 Determine the Relationship Between Respondents' Technical Knowledge and the Choice of CRS Types

This section was discussed and analyzed the relationship between respondents' technical knowledge and the choice of correct types of CRS. Shows in **Table 4. *5*** is the results of the analysis.The hypothesis that has been designed shown as below:

a) Ho :There is no significance relationship between technical knowledge level among respondents and the choice of correct CRS types.

b) Ha :There is a significance relationship between technical knowledge level among respondents and the choice of correct CRS types.

Table 4. 5 : Chi- square test results

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	163.875a	1	.000		
Continuity Correction[b]	161.026	1	.000		
Likelihood Ratio	174.343	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	163.425	1	.000		
N of Valid Cases	364				

Since Chi-square value is 163 and is greater than critical value which is 3.841, we reject the null hypothesis. Therefore, there is a significance relationship between technical knowledge level among respondents and the correct choice of CRS types.

5. Conclusions

To answer objective 1, a questionnaire has been distributed to the respondents who live around Batu Pahat areas. A total of 382 respondents were involved to answer the questionnaire. The questionnaire consists of 4 parts. The part related to objective 1 is part C which is the questions related to the related to CRS. Therefore, section C contains 12 questions related to respondents' technical knowledge related to CRS. As a result of the findings of the study, all 12 questions have been analyzed using the mean average score method to determine the level of respondents technical knowledge towards CRS. The mean for 12 questions was total up and divided with the total number of items (questions).

Therefore, for this study there are two types of level that are identified which are low and high level. The mean score range for low level is 1.00 to 3.66 and high level is 3.67-5.00 (Wiersma, 1995). Based on the analysis, the result for the technical knowledge level of respondents towards CRS is high which is the mean value is 3.7148. Although on average all 12 questions in section C that are related to the level of technical knowledge of respondents related to CRS is high, but there are still some questions related to the technical knowledge of respondents related to CRS show a low level. Among the survey questions in section C (respondents' technical knowledge on CRS) which show a low average level is "Do you think that the legislation of the use of CRS in Malaysia can be fully implemented by the public?". This question only got an average level of 3.4424 which is the lowest among the 12 questions provided in section C. It can be concluded that adults in Batu Pahat areas having high technical knowledge level on CRS, however, they still in doubt whether the policy on mandatory use of CRS in Malaysia can be fully implemented.

Besides that, the level of child safety while in the vehicle should be at the best level. To ensure that the level of child safety can be improved, it is very important to study the relationship between the level of technical knowledge of respondents related to CRS and the selection of the correct type of CRS. This is because the selection of less suitable CRS will affect the rate of effectiveness of CRS function on child safety as stated in chapter 2. Based on the Chi-square test which has been carried out, it is found that there is a significance relationship between technical knowledge level among adults' and the choice of correct CRS type. The value for the Chi-square test is $\chi^2 = 163.875$.

Acknowledgment

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