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A Study on Adults' Perception Towards The Use of Child Restraint System (CRS) in Batu Pahat, Johor

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Abstract: Child Restraint System (CRS) is a tool to protect children from road collisions. Many children still remain unstrained or improperly restrained. Therefore, it is essential to understand the significance of CRS usage and the perceptions of adults' in utilizing CRS. Thus, the objective 1 for this study is to determine the factors influencing adults' perception in utilizing CRS. Meanwhile, the objective 2 is to investigate the relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS. A questionnaire in a form of Google Form was developed and distributed to 384 respondents whose age 18 years old and above in Batu Pahat areas via online platform. The data obtained were analyzed using statistical package for social science (SPSS) version 26.0. Exploratory Factor Analysis (EFA) method is utilized to achieve objective 1. 3 factors are obtained from EFA namely as child safety, perceptions of adults' on CRS and barriers of installing CRS. The Chi square test is used to achieve objective 2. Based on the mean score, the factors that results in the high usage of CRS among adults in Batu Pahat areas are child safety and perceptions of adults' on CRS. Meanwhile, the factor that results in the low usage of CRS among adults' in Batu Pahat areas are the barriers of installing CRS.. Therefore, the Chi Square test shows that there is a significant relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS. Hence, many initiatives can be introduced such as a strict implementation of the CRS law in Malaysia, promotions for child safety seats and convertible CRS type for children.

Keywords: Child Restraint System, CRS, EFA, Batu Pahat

1. Introduction

According to Malaysia Institute of Road Safety (MIROS), child traffic injuries are a global public health problem [1]. In Malaysia, children aged 1 to 4 are the most exposed victims in road accidents among young private vehicle passengers, which mostly occur within the residential areas [2]. The consequences of traffic injuries on children is more likely severe than to an adult. Despite this evidence, the usage of child restraint system (CRS) in Malaysia has been historically low.

CRS are created to protect children from suffering severe injuries due to road crashes when it is correctly installed and used. Besides that, a dire gap was identified between positive attitude towards the usage of CRS and a very less usage in the study sample, suggesting that further study is required to explore the factors influencing adults' perception in utilizing CRS [3].

Motor vehicle occupant injury is a problem and car seats are the prevention strategy [4]. Adults, especially parents having less awareness on the benefits of adapting CRS has been the major obstacle for adults to acclimate it. Hence, this study is conducted to determine the use of CRS and the factors that directly influence the perceptions of adults in utilizing CRS in Batu Pahat, Malaysia. The primary objective in this study is to determine the factors influencing adults' perception in utilizing CRS whereby the second objective is to investigate the relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS.

1.1 The use of CRS for children

CRS protect infants and children in reducing injury and preventing them from deaths [5]. Children travelling in vehicles without CRS are more prone to severe injuries and fatalities in MVCs [6]. Hence, according to some researchers, CRS can reduce the risk of fatal injury by 71 percent for infants (younger than 1 year old) and by 54 percent for toddlers (1 to 4 years old) in passenger cars [7]. Installing CRS for new born babies or young children can restrain the child from exceeding by the force to project the baby toward the front of the vehicle. According to some studies, children that are properly restrained are prevented from any internal body part damages during a crash [8].

1.2 Factors that influence the usage of CRS.

Experts globally have said that child injuries is becoming major public health issue that seeks immediate attention [2]. Besides from the economics of the nation, adults gives more attention to their own perceptions and comfort zone whereby the space available in a vehicle much influence the usage of CRS [9]. Hence, this study have done further research on the factors influencing adults' perception in utilizing CRS among the adults' in Batu Pahat areas.

The survey is conducted in Johor as this state has been reported as the second state that contains the highest road accidents after Selangor. Batu Pahat is choosen as the location for this study.

2. Methods

The case study of this research is located in Batu Pahat, Johor. The population of adult in Batu Pahat in the year of 2010 is 261,213 [10]. According to Department of Statistic Malaysia (DOSM), the population growth for Batu Pahat is 1.4% every year [10]. Therefore, the assumption of adult population of Batu Pahat district for the year 2020 is estimated around 264,870.

According to Krejci & Morgan, the sample size for this study is 384 [11]. Respondents in this research are adults whom are above 18 years old and residents in Batu Pahat, Malaysia. In addition, the targeted respondents for the pilot study is 38. The data of the respondents are collected through the distribution of questionnaires. Due to the Covid-19 pandemic, this survey was conducted via Google Form as an instrument to collect data and to achieve all the two objectives of this research.

The questionnaire is then divided into 3 parts. Section A consists of multiple choice questions, then followed by section B and C that have 5 Likert scale ranging from 'strongly agree' to 'strongly disagree'. Scetion A of the questionnaire is about the personal information of respondents. For part B, explained about the use of CRS and secondhanded CRS for children when traveling. Finally, part C described on the factors influencing adults' perception in utilizing CRS. Previous research states that drivers' perception and income towards CRS utilization is the significant factor affected on the usage of CRS [5]. In this part, researcher can know the ways respondents practicing CRS in their daily life as each respondent have different opinions towards CRS.

The questionnaire is designed in Malay language so that the respondents can understand better considering the respondents are from various backgrounds of education level. The collected data is then analysed and interpreted by using Statistical Package for the Social Sciences (SPSS) version 26.0.

2.1 Research Design

In this study, the descriptive statistical analysis was conducted by utilizing the frequency method on nominal data which involves gender, age, marital status, number of children and monthly household income. The data from the analysis is then displayed in the form of percentage. This descriptive statistical analysis is usually used for quantitative analysis of the data which comes along with simple graphic analysis. The prime benefit by using this analysis method is that it will enable the researcher to deduce large number quantity of the data in a rational way [12].

2.2 Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) method is utilized in this study to construct the factors that underlie a dataset based on the correlation between the variables [13]. the factors that describe the highest proportion of variance of the variables are expected to represent the underlying constructs. The process of EFA initiate with an initial analysis run to attain eigenvalues for each factor in the data. The Kaiser-Meyer-Olkin (KMO) test was used to verify the sampling adequacy for the analysis. The KMO value should be greater than 0.5 [14]. Bartlett's Test of Sphericity were performed to identify construct validity and to confirm that the data collected for an EFA were relevant [15]. Bartlett's Test of Sphericity must attain a statistical significance of less than ($\alpha < 0.05$) in order to conduct an EFA.

Then, the scree plot test is carried out to test the data of the study. This method requires to plot eigenvalues against the number of factors in order to discover where a significant drop occurs within factor numbers [16]. The factor solution was determined based on the numbers of eigenvalue that are greater than 1.0 [17]. In this study, the sample size is 384 which is more appropriate to imply scree plot test to attain the factors influencing adults' perception in utilizing CRS.

From the result of the scree plot test, direct oblimin rotation is used when there is an expected correlation between factors. Besides, oblique rotations allow factors to correlate and therefore they are more realistic in this study [18]. Since the items were developed based on the dimensions, hence there is some correlation expected between factors. In addition, Oblimin rotation was conducted as it is relevant for the current data set, because it is logical to assume that factors are correlated given the subjective nature adults' perceptions on CRS.

2.3 Chi- Squre Test (Goodness of fit test)

The purpose of utilizing Chi-Square test is to determine the relationship between categorical variables. In this study, Chi-Square Test is used to determine the importance of the relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS. Moreover, Chi-Square test is used to assess the tests of independence when using a cross-tabulation that shows the distributions of two categorical variables appearing in the cells of the table. Hence, a 2x3 contigency table is deduced from the data. Besides, to carry out the Chi-Square test, there are four significant steps required. Hence, the process including state the hypothesis for the study, construction of a 2x3 contigency table, analyse sample data and interpret the results obtained. Hence, the formula of Chi-Square Test is shown in the Equation 1 below.

$$X^2 = \sum \frac{(f_0 - f_e)^2}{f_e} \pi r^2 \quad \text{Eq. 1}$$

f_o = the observed frequency (the observed counts in the cells)
f_e = the expected frequency if NO relationship existed between the variables

For this study the hypothesis is design such as below before perform the Chi-Square test.

Ho : There is no significance relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS.

Ha : There is significance relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS.

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

3. Results and Discussion

Before distributing the questionnaire to the 384 respondents, pilot study is conducted to determine the feasibility of the study protocol and the weakness in this study. From the 384 respondents, 10% of the total sample projected whereby 38 respondents are selected for the pilot study. The data obtained is then analysed using SPSS version 26.0 to obtain the Cronbach's alpha value. Table 1 shows that the Cronbach's alpha value of 0.976 for 27 items, which is considered excellent [19]. Thus, the questionnaire can be distributed to the respondents.

Table 1: Realibility Statistics for 38 respondents

Cronbach's Alpha	N of items
0.976	27

3.1 Data Analysis

A total of 384 respondents have contributed in the survey and the respondents' profiles are as shown in Table 2. Respondents gender, age, education level, marriage status, number of child, monthly household income and car ownership status informations are presented in Table 2 below.

Table 2: Respondents demographic informations (n=384)

Item	Frequency	Percentages, %
Respondents Gender		
Male	142	37.0
Female	242	63.0
Respondents Age		
18-25	10	2.6
25-40	204	53.1
41-60	153	39.8
>60	17	4.5
Respondents Highest Eduation Level		
Secondary School	51	13.3
Certificate and Diploma	165	43.0
Bachelor's Degree	159	41.4
Master and PhD	19	2.3
Respondent Marriage Status		
Bachelor	27	7.0
Married	352	91.7
Widow	1	0.3
Divorced	4	1.0

Respondent Child Status		
Have Child	349	90.6
No child	36	9.4
Monthly Household Income		
< RM2000	23	6.0
RM2000-RM4000	197	51.3
RM4000-RM6000	145	37.8
>RM6000	19	4.9
Respondent Car Ownership		
Yes	384	100.0

According to the Table 2, most of the respondents are female which is about 63%. Next, 53.1% of the adults ranging from the age group 25-40 are considered as the majority in this study.43% of the respondents are dipoma and certificate holders whereas 41.4% of them are bachelor's degree holders. 91.7% respondents are married and 90.6% of them have child. Most of the respondents earns from RM2000 to RM6000 whereby 51.3% respondets earns RM2000 TO RM4000 and 37.8% resspondents monthly ncome range between RM4000-RM6000 . All of the respodents whereby about 100% of them do own atleast a car.

3.2 Research analysis for objective 1

To achieve the first objective of this research, EFA method has been used to identify the factors influencing adults' perception in utilizing CRS. In this study, the Kaiser-Meyer-Olkin (KMO) result is 0.844, which is greater than 0.5 which is considered good [14]. According to this study, the statistical significance obtained is 0.000 which is accepted [15].
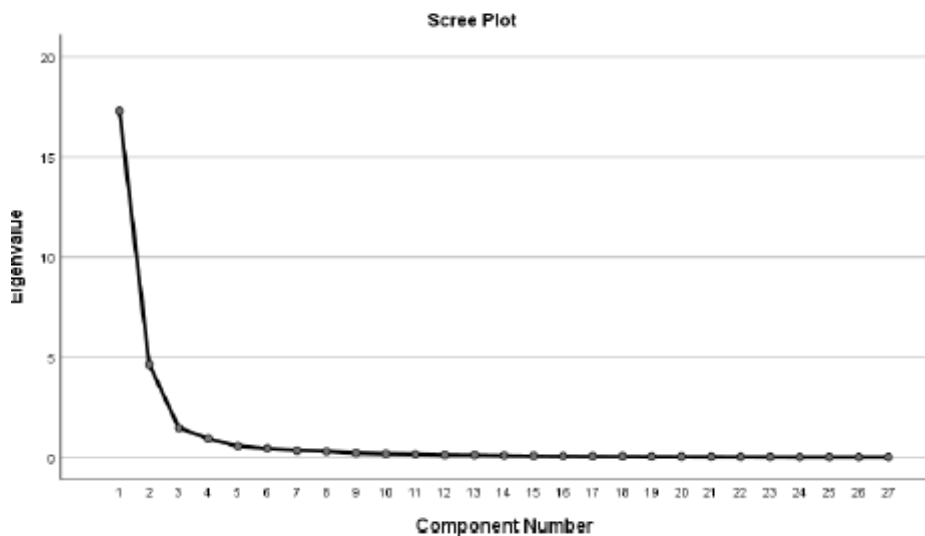

Figure 1 : Scree Plot Test

Based on the scree plot test shown in Figure 1, the slope clearly declining at the elbow whereby the significant drop occurs at factor 3. Hence, this can be concluded that there are three factors can be deduced from this study.

Table 3: Rotational Method

Component	1	2	3
Cannot predict safety of CRS by just looking at it.	0.983		
Not to sell recycle CRS to medium income families.	0.956		
Unsafe to use same CRS.	0.951		
A normal seat is better than a recycled CRS.	0.949		
Not purchasing CRS through online.	0.941		
Recommendation by store need to be considered when purchasing CRS.	0.940		
Adults focus on the safety ratings by other CRS users before purchasing.	0.933		
I frequently restraint my child when driving.	0.932		
Recycled CRS is not safe to be reused.	0.907		
Do not sell recycle CRS to low income families.	0.903		
It is not advisable to sell second hand CRS to others.	0.888		
Feel guilty selling the second hand CRS to others.		0.955	
CRS is efficient in protecting a child in a collision.		0.954	
CRS prevent children from being thrown away from their seat in a collision.		0.949	
CRS is not necessary for short distance travelling.		0.945	
Second hand CRS is not the same as brand new CRS.		0.944	
CRS protects child in a collision		0.943	

Dangerous for children to travel without CRS.	0.929	
CRS not necessary for children below 12 years old.	0.873	
Adults opinion influence the usage of CRS.	0.868	
CRS is important.	0.830	
CRS do not occupy too much space in vehicle.		0.909
My children find CRS comfortable.		0.890
CRS is easy to install.		0.856
Afford to buy CRS for my children.		0.850
Multiple vehicles does not contribute to the difficulties in installing CRS.		0.662
Clear on the types of CRS for children.		0.517

Table 3 shows that there are 11 items (questions) in factor 1 which represents 'child safety' as a prime factor. Next, factor 2 consist of 10 items (questions) which represents the 'perception of adults' on CRS usage' factor. Factor 3 contains 6 items (questions) which signifies the 'barriers adults' faced due to the installation of CRS' factor.

Table 4: Component Correlation Matrix

Component	1	2	3
1	1.000	0.490	0.695
2	0.490	1.000	0.512
3	0.695	0.512	1.000

Component correlation matrix is designed to determine the best way between orthogonal and oblique rotation from SPSS with the desired number of factors. Hence, according to Table 4, the component correlation matrix correlate above the value 0 which it means the factors are highly correlated [20]. Hence, this dataset uses direct oblimin method as rotational method.

Table 5: Factors Influencing Adults' Perception in Utilizing CRS and the mean factor loading

No.	Factors Influencing Adults' Perception in Utilizing CRS	Mean Loading
1	Child safety factor	0.935
2	Perception of adults' on CRS	0.919
3	Barriers of installing CRS	0.781

Hence, through the EFA method from Table 3 pattern matrix, the 3 main factors that influenced the perception of adults on the usage of CRS among adults has been figured out as shown in Table 5.

3.4 Research analysis for objective 2

The objective 2 of this research is to analyse the relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS. The average mean values from the factors in Table 5 is deduced in Table 6.

<p align="center">Table 6: Factors Influencing Adults' Perception in Utilizing CRS and the average mean value</p>

No.	Factors Influencing Adults' Perception in Utilizing CRS	Average Mean Value
1	Child safety factor	4.03
2	Perception of adults' on CRS	4.36
3	Barriers of installing CRS	1.29

From Table 7, a 2x3 contigency table is produced with two variables which are the factors influencing the adults' perception in utilizing CRS attained in EFA method and the probability of the usage of CRS among the adults' in Batu Pahat areas. The contigency table is shown in Table 7.

<p align="center">Table 7: A 2x3 contigency table</p>

			Factors Influencing Adults' Perception In Utilizing CRS			
			Child safety factor	Perception of adults' on CRS	Barriers of installation of CRS	Total
Probability of respondents using CRS.	Low probability in using CRS	Count	0	0	6	6
		Expected Count	3	2	1	
	High probability in using CRS	Count	11	10	0	21
		Expected Count	9	8	4	
Total		Count	11	10	6	27
		Expected Count	12	10	5	

Based on data in Table 7, the perception of adults' on CRS highly influence the probability of CRS usage whereby the average mean value for the 10 items are is 4.36 that is greater than 3.67. Next, the child safety factor consist of 11 items with the average mean score which is 4.03 that is greater than 3.67 also highly influence the usage of CRS. Meanwhile, the observed count for barriers of installing CRS is 6 items that have the average mean values of 1.29 which is below 3.67 results in the low probability of CRS usage.

From this, it can be concluded that the factors of child safety, perceptions of adults' on CRS and barriers of installing CRS factors are strongly influence the usage of CRS among adults' in Batu Pahat areas. Table 8 deduced observed count and expected count for chi square test calculation.

Table 8: Calculation of observed count nd expected count for Chi-Square Test (Goodness of fit test)

Observed Value, O	Expected Value, E	(O-E)	(O-E)^2	$\sum X^2 = \sum \frac{(O-E)^2}{E}$
11	9	2	4	0.4
10	8	2	4	0.4
0	4	-4	16	4.0
0	3	-3	9	2.0
0	2	-2	4	2.0
6	1	5	25	25.0
			Total, $\sum X^2$	33.80

Table 8 above represents the calculation of chi-square test. Based on the alpha value, α which is 0.05 and the value for the degree of freedomof 2, the critical value of chi-square is 5.99. The chi-square value in this study obtained is 33.80 which is greater than the critical value 5.99. Thus, the null hypothesis is rejected and alternative hypothesis is accepted. Thus, there is a significant relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS.

4. Conclusion

According to this research, the objectives have been accomplished. The first objective of this study is to determine the factors influencing adults' perception in utilizing CRS. Hence, based on the EFA done, there are 3 factors constructed that are influencing the adults' perception in utilizing CRS. The factors are name as 'child safety' whereby the average factor loading for the 11 items under this factor is 0.935. Followed by the 'perceptions of adults' on CRS' factor in which the average factor loading is 0.919 for the 10 items classified under this factor. Meanwhile, the third factor is the 'barriers of installing CRS' consists of 6 items under it with the average factor loading of 0.781.

For the second objective, which is to investigate the relationship between the use of CRS and the factors influencing adults' perception in utilizing CRS, Chi-Square test of Goodness of fit was applied. The chi square value is 33.80 which is greater than the critical value of 5.99. Based on the result of the Chi-Square test there is a relationship between the use of CRS and the factors influencing the adults' perception in utilizing CRS. The grouping of items influencing high and low usage of CRS were based on the mean score of the items.

In future, upcoming researchers can emphasis more studies on designing CRS for more convenience of children simultaneously designing special foldable CRS that can place more than one child with affordable price. Besides, a similar study can be carried out by using another method such as a qualitative method through interview session. Interview session enables receiving detailed explanations from parents and guidance through face to face and find a much clearer perceptions of adults' on CRS and the factors influencing the CRS usage compared to questionnaire approach via online platform.

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