

## A Safer Future For Children Through Road Safety Education In School; Lesson Learned From Malaysia

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### Abstract

Road accidents involving children are often the result of factors, such as hazards, limited awareness and their ongoing cognitive development. To address this, the Road Safety Department (JKJR) and MIROS developed a new Road Safety Education (RSE) Module to impart road safety knowledge to Bahasa Melayu subject. The study focused on 720 participants aged 10-12 and aimed to explore the relationship between age, gender, RSE input, road safety knowledge, and behaviour. The research employed surveys and questionnaires and found that while gender did not significantly impact road safety knowledge, there was a positive link between gender and safety-related behaviour. Moreover, the study highlighted a positive connection between RSE input and road safety behaviour, though not strongly tied to road safety knowledge. Age was found to effect road safety knowledge compared to behaviour more significantly. These findings offer insights for designing effective road safety education programs for Malaysian children.

**Keyword:** Rse Input, Knowledge, Perceived Behavior, Children, Malaysia

### Introduction

Road traffic accidents are a concern resulting in the loss of lives worldwide (according to WHO, 2018). It is widely recognized among individuals that road crashes play a role, in causing fatalities. They account for 35 40% of injuries, among teenagers and young adults worldwide. Risky road behaviours significantly contribute to these fatalities (Hultgren et al., 2022; Akin et al., 2022). While road accidents affect individuals of all ages, they represent a significant global concern that disproportionately affects young people prone to injury and death.

The higher susceptibility of individuals to road accidents can be attributed to several factors. These include their exposure to traffic situations due to lack of experience (Simpson & Mayhew 1987) and the cognitive and emotional aspects associated with the development of their brains (World Health Organization, 2009), negative peer pressure (Møller & Haustein, 2014). Furthermore, Children and teenagers are more susceptible to road accidents because of their inadequate knowledge, bodily restrictions, and inclination towards taking risks (Staksrud & Livingstone, 2009; Redfield et al., 2020).

Many countries have launched road safety interventions due to the recognition of the significance of preventing traffic injuries and addressing behavior among children and adolescents who are particularly susceptible (Teye-Kwadjo, 2017; Topolšek et al., 2019; Alonso et al., 2018). Certain programs place emphasis on acquiring skills and a thorough understanding of traffic regulations. (Teye-Kwadjo, 2017; Topolšek et al., 2019; Pressley et al., 2016). Some programs take an approach seeking to enhance awareness and knowledge about risk factors in traffic by providing information through Road Safety Education (RSE) in schools (Zainafree et al., 2022; Valentová & Brečka, 2021; Alonso et al., 2018).

The implementation of Road Safety Education (RSE) in Malaysia on 2007 was introduced by adopting the curriculum from Australia. After eight years of implementing RSE in Malaysia, Road Safety Experts have identified limitations in the syllabus that schools have enforced on teachers and students. The Malaysia Institute of Road Safety Research (MIROS) initiated research on RSE and, in collaboration with the Road Safety Department (JKJR), identified a new RSE Module well-suited for Malaysian road users that was successfully launched in the year 2018. The purpose of establishing the new module is to ensure the new curriculum suits the implementation of KSSR and KSSM from KBSR and KBSM. According to the Department of Statistics Malaysia (DOSM), the population of children below 18 years old in Malaysia is 9.13 million, which represents 28 % of the whole population in Malaysia for 2021. This specifies that the figure for children under 7 to 12 years old is 3.00 million. DOSM also stated that in 2020, transport accidents were included in the rank of Cause of Death Among Malaysians at fourth place, representing 2.9 %. Based on the age rank, 3% of deaths for children under 0 to 14 are due to transport accidents. Due to the figure, the government believes that education is the root of changing behaviour and attitude, especially in road safety.

Previous research depicts that Road Safety Education can positively affect children's behaviour as they learn to become more aware of the potential dangers of road travel. Studies have extensively investigated the positive consequences of road safety education programs on school-aged children's road safety behaviour (Zainafree et al., 2022; Valentová & Brečka, 2021; Alonso et al., 2018). This happens because when children are educated about the hazards of traveling on the road they become more conscious of the dangers and are inclined to take safety measures while on the streets. Many factors such as the speed and volume of traffic as individual behavior play a significant role in determining the risk of injury to children in various environmental settings (Trifunović et al., 2017). In previous studies, a lack of road safety knowledge with a high level of risky behaviours is likely associated to traffic injuries (Dong et al., 2010). With the rapid increase of vehicles on the road, road safety knowledge has become one factor in overcoming road traffic injuries. While it is advised to keep children away from potentially hazardous road traffic, Alonso et al., (2018) suggesting that road safety education equips children with practical tools to develop safer behaviors on the road.

Road safety education interventions have demonstrated a favourable impact on enhancing the protective outcomes of behavioural factors. Therefore, a comprehensive strategy to ensure road safety must encompass interventions at different levels, including the individual, the vehicle, the road infrastructure, and governmental policies. On an individual level, this study entails educating young people. To this end, this study aims to measure how age, gender, and exposure to road safety education received through formal schooling impact children's knowledge and behaviour in Malaysia through three objective:

- The first objective was to explain the correlation between gender with knowledge and self-reported behaviour.
- The second objective is to know how RSE input affects knowledge and self-reported behaviour.
- The third objective is understanding how age influences knowledge and self-reported behaviour.

Our hypothesis states that students receiving more input on road safety education will demonstrate increased knowledge and more responsible behaviours than those without such education. We further presume that there will be a significant difference in behaviour based on the gender and age of the children involved.

## **Methodology**

### **Research Design & Sampling**

This cross-sectional study was utilised as a framework to conduct the whole study using the quantitative research method. This study applied two-stage sampling comprising purposeful and simple random sampling to gather the data. Based on the road crash statistics provided by the Royal Malaysia Police we have identified a total of six states that exhibit patterns. The six districts shortlisted for having the highest number of crash cases involve children, between the ages of 10 and 12. Each district represents one state. Six districts were identified, as listed in Table 1 below. Six locations were selected for a study on preventing risky behaviour among children in Malaysia, including Peninsular Malaysia, East Coast, and East Malaysia. These locations were chosen based on road crashes rates in Malaysia districts. The Peninsular Malaysia location was in Kubang Pasu, Kedah while the central Selangor location was in Kuala Selangor. The East Coast location was Kota Bharu, Kelantan and the southern location was Batu Pahat, Johor. East Malaysia's Kota Kinabalu, Sabah and Sarawak's city of Miri were also selected.

At the second stage a random selection was made of four schools from each district to participate yielding 24 schools which comprised students between the ages of 10 and 12. Ten standards of 4 to 6 students were included as a sample for each school. Data collection took place before the end of school terms, which begins in November 2022 until February 2023 after the module has been used for more than ten months.

Table 1

*Selected districts for the study*

No.	Location	Zone	Sate	District
1	Peninsular Malaysia	Northern	Kedah	Kubang Pasu
2		Central	Selangor	Kuala Selangor
3		East Coast	Kelantan	Kota Bharu
4		Southern	Johor	Batu Pahat
5	East Malaysia		Sabah	Kota Kinabalu
6			Sarawak	Miri

**Research Instrument**

To fulfill the objective of this study, we have designed surveys and checklists tailored explicitly for primary school students aged seven to twelve years old. These questionnaires aim to gather insights into their knowledge and understanding of road safety education. Additionally, we have developed an approach by conducting one-on-one interviews with the students to supplement our findings.

There are three sections included in the instrument. Section A focuses on demographic information, including names, age, race, gender, school name, district and state. Section B addresses students' knowledge about road safety and comprises 30 questions aligned with the themes and syllabus covered in the RSE book. Section C explores students' behaviour on the road. The details of the research instrument can be found in the table provided below.

Table 2

*Summary of the Research Instrument*

Section	Aspect involved	Description
A	Demographics	Name, age, gender, race, school name, district, state.
B	Knowledge students	30 Questions from the listed topic
C	Student behaviour	1. Land Transport
		2. Road Environment
		3. Road Rules and Regulations
		4. Pedestrian Behavior
		5. Cyclist Behavior
		6. Passenger Behavior

**Research Ethics and Procedure**

This research project starts from November 2022 until February 2023. The data collecting process started once approval was given from The Educational Planning and Research Division (EPRD), Ministry of Education. Once the proposal was approved, the research team informed the officers from the selected State Education Departments and the District Education Offices regarding the school's involvement in this study. Arrangements for data collection were made once the school administrators conceded with the proposed study.

Before the data collection phase, the researchers contacted the principals and the teachers-in-charge from each school to brief the school personnel about the research project. Upon the school's agreement to be involved in the study, a letter about details of the school visit and an approval letter from the Ministry of Education was delivered to the respective school.

A total of 24 schools were involved in this data collection from November 2022 to February 2023.

### Data Analysis

The data analysis was conducted after the data were gathered, collected and entered into the IBM SPSS 23 software for quantitative data. A descriptive statistic was applied to illuminate the frequency and of the quantitative. As for inferential statistics, Pearson correlation analysis was utilised to seek relationships between knowledge and behaviour, gender and knowledge, gender and behaviour, the usage of the RSE book and knowledge and the usage of the RSE book and behaviour. Otherwise, One-way ANOVA was used to look between groups for age and road safety knowledge among students.

### Results

Based on the data presented in Table 3 the study included a total of 720 participants. Out of these participants there were 349 males (48.5%) and 371 females (51.5%). In terms of age distribution an equal number of participants (240 individuals; 33.3%) were, between the ages of 10 and 12 years old. When it comes to representation the majority of participants identified as Malay (578; 80.3%) followed by Bumiputera Sabah (56; 7.8%) Bumiputera Sarawak (53;7.4%) Chinese (4;0.6%) and Others (29;4%).

Table 3  
*Demographic Data*

Demographic Categories	Frequency	Valid Percentage (%)
<b>Gender</b>		
Male	349	48.5
Female	371	51.5
<b>Age</b>		
10 years old	240	33.3
11 years old	240	33.3
12 years old	240	33.3
<b>Race</b>		
Malay	578	80.3
Chinese	4	.6
Bumiputera Sabah	56	7.8
Bumiputera Sarawak	53	7.4
Others	29	4.0

In terms of behavior and knowledge levels among the participants (as shown in Table 4) both males and females exhibit levels of behavior at 94.8% and 96.5%, respectively. Similarly both genders also demonstrate levels of knowledge with males at 88% and females at 87.1%. Looking at age groups the table reveals that a significant majority of 10 year participants (97.1%) exhibit levels of behavior. Comparatively this percentage slightly decreases to 94.6% for 11 year olds. Rises again to 96.4% for those who're 12 years old. As for knowledge the data shows that a substantial percentage (93.8%) of 10 year olds have levels of understanding while this figure drops to 76.3% for those eleven and increases again to reach a level of, around (92.5%) among twelve year olds.

Table 4

*Correlation between Behavior and Knowledge*

	Behaviour (%)		Knowledge (%)		
	Average	High	Low	Average	
Gender					
Male	5.2	94.8	0.3	11.7	88
Female	3.5	96.5	0.3	12.7	87.1
Age					
10 years old ( st	2.9	97.1	0.8	5.4	93.8
11 years old	5.4	94.6	-	23.8	76.3
12 years old	4.6	96.4	-	7.5	92.5

Table 5 shows the connections between Knowledge, Behavior, Gender and RSE Input. Gender does not show any correlation with knowledge (0.048). It does exhibit a slight positive correlation with behaviour (0.085\*), suggesting that gender may have a modest impact on one's behaviour. Conversely, there is no correlation between the amount of RSE input received and knowledge (0.024). However, a correlation between behavior and RSE Input (0.090\*) indicates that higher levels of RSE Input correspond to behaviours.

Table 5

*Correlation between Knowledge and Behaviour with Gender and RSE Input*

Aspect	Knowledge	Behaviour
Gender	.048	.085*
RSE Input	.024	.090*

One way ANOVA revealed a difference ( $F(2,717) = 43.578, p = .001$ ) in the road safety knowledge levels among students of ages. Further examination using the Tukey HSD test (Table 6) showed that 10 year old children had a mean score ( $M = 10.7667, SD = 1.52, p < .001$ ) compared to 11 year olds ( $M = 9.5625, SD = 1.52, p < .001$ ) and 12 year olds ( $M = 10.1833, SD = 1.17, p < .001$ ). The group of 10 year olds displayed the highest score in road safety knowledge. It is noteworthy that there were variations in knowledge scores observed among students across standard levels. Students in standard 5 and 6 consecutively scored lower compared to students in standard 4.

Table 6

*Mean difference of knowledge according to age*

Age	N	Mean	Std. Deviation	F value	Sig
10 yr	240	10.7667	1.51552	43.578	.000
11 yr	240	9.5625	1.52121		
12 yr	240	10.1833	1.17494		
Total	720	10.1708	1.49454		

The information presented in Table 7 provides insights into the road safety knowledge of children based on their age. The table displays measures, including mean differences, standard errors, significance levels and confidence intervals for each comparison between different age groups. Notably the results indicate a disparity in road safety knowledge among 10 year olds 11 year olds and 12 year olds. There is a difference of 1.20417 in road safety knowledge, between 10 to 11 year olds. This finding is supported by an error of .12901 and a



significance level of .000. The 95% confidence interval ranges from .9012 to 1.5071. The mean difference between 10- to 12-year-olds in road safety knowledge is .58333, with a standard error of .12901 and a significance level of .000. The 95% confidence interval ranges from .2804 to .8863. The mean difference between 11-year-olds and 12-year-olds in road safety knowledge is -.62083, with a standard error of .12901 and a significance level of .000. The 95% confidence interval ranges from -.9238 to -.3179.

Table 7

*Multiple Comparisons of road safety knowledge based on age*

(I) Tahun	(J) Tahun	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
10 yr	11 yr	1.20417*	.12901	.000	.9012	1.5071
	12 yr	.58333*	.12901	.000	.2804	.8863
11 yr	10 yr	-1.20417*	.12901	.000	-1.5071	-.9012
	12 yr	-.62083*	.12901	.000	-.9238	-.3179
12 yr	10 yr	-.58333*	.12901	.000	-.8863	-.2804
	11 yr	.62083*	.12901	.000	.3179	.9238

\*. The mean difference is significant at the 0.05 level.

The ANOVA results indicated no significant effect of age on Behaviour scores,  $F(2, 717) = 1.678$ ,  $p = .188$ . (see Table 8). Post hoc tests using Tukey HSD were conducted to compare the Behaviour scores of each group. The results showed no significant pairwise differences between any of the three groups (all  $p > .05$ ). The results of this study suggest no significant differences in Behaviour scores across the three different years of students. This suggests that the year of study does not significantly impact behaviour scores. However it is important to acknowledge that there might be factors that were not considered in this study, which could potentially contribute to variations, in behavior scores among groups of students. It is crucial to conduct research to delve deeper into the influences on behavior scores and understand them better.

Table 8

*Mean scores and standard deviations for age groups*

Age	Sample	Mean	Std. Deviation	F value	Sig
10 yr	240	55.93	4.377	1.678	.188
11 yr	240	55.15	4.532		
12 yr	240	55.58	5.066		
Total	720	55.55	4.672		

Table 9 shows the test results between the mean scores of different age groups for 10 years old, 11 years old, and 12 years old. The mean difference between the groups is calculated with the standard error, significance level, and confidence interval. The mean difference between 10 and 11 years old is 0.779, with a standard error of 0.426 and a significance level of 0.161. The 95% confidence interval ranges from -0.22 to 1.78. Similarly, when comparing 10-year-olds to 12-year-olds, the mean difference is 0.350, with a standard error of 0.426 and

a significance level of 0.690. The 95% confidence interval ranges from -0.65 to 1.35. When comparing 11-year-olds to 12-year-olds, the mean difference is -0.429, with a standard error of 0.426 and a significance level of 0.573. The 95% confidence interval ranges from -1.43 to 0.57. Thus, there is no significant difference between the age groups compared.

Table 9

*Differences in mean and confidence intervals based on age group*

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
10 yr	11 yr	.779	.426	.161	-.22	1.78
	12 yr	.350	.426	.690	-.65	1.35
11 yr	10 yr	-.779	.426	.161	-1.78	.22
	12 yr	-.429	.426	.573	-1.43	.57
12 yr	10 yr	-.350	.426	.690	-1.35	.65
	11 yr	.429	.426	.573	-.57	1.43

### Discussion

According to the study there is no connection between gender and knowledge (0.048) but depicts slight positive correlation exists between gender and behavior (0.085\*). This suggests that ones gender may have an influence on their behavior. Research suggests that gender could play a role in shaping behavior although the relationship between the two is not particularly strong. This is due to discrepancies in boys' brains and girls' size and connectivity within various regions (Zaidi, 2010). These structural dissimilarities may contribute to disparities observed between genders, such as variations in cognition, emotion regulation, and social behaviours. Moreover, hormones are involved in shaping gender-specific traits. For instance, testosterone is known for promoting assertiveness and competitiveness, while estrogen can influence emotional states (Zaidi, 2010)

Personality traits, cultural background and life experiences are likely to play a role, in shaping behavior than just gender alone. However it is still important to consider gender when studying behavior. This is because it could impact how individuals behave in certain situations. Thus, researchers should consider gender while studying behaviour among humans. Based on research by Fu & Zou (2016), boys take more risks in pedestrian environments than girls. It has also been observed that there are apparent differences in how genders perceive risk-taking behaviours leading to injury-risk behaviours being repeated more frequently by boys than girls, who tend to blame their own decisions for accidents (Morrongiello, 1997).

On the other hand, according to O'Neal et al. (2008), girls tend to behave more cautiously on the road, perhaps because they have less knowledge about how to act safely. According to Morrongiello (1997), boys are more likely to attribute injuries to bad luck and girls to their behaviour and decisions, leading boys to repeat injury-risk behaviours more often than girls. It is concurrent with the study of Ištoka Otković et al. (2021) that found that boys were almost twice as likely as girls to be involved in pedestrian accidents, with this trend increasing with age, making them even more vulnerable to such occurrences. As such, teachers must adopt a more inclusive approach when teaching road safety. An intersectional approach to road safety education that considers an individual's background and social identity can help address the unique challenges individuals of different genders face. Through this method, teachers can develop tailored strategies that empower all students with essential knowledge and skills to navigate complex traffic situations safely.



For the second objective, the study shows no correlation between the total amount of RSE input received with knowledge (0.024). Otherwise, the result shows a correlation between RSE Input and its behaviour (0.090\*). The result shows that RSE input slightly influences behaviour knowledge levels across different age groups, with 10-year-old participants having the highest self-reported behaviour and knowledge rating. However, knowledge may not significantly predict behaviour related to the RSE input received. More research is necessary to delve into the factors that influence behavior concerning the use of topics and to create interventions that encourage behavior. It's important to remember that correlation doesn't necessarily mean causation; there may be variables that provide an explanation, for the connections, between these factors. According to the research, the most effective method is through educational activities, emphasising teachers' role models in student interaction (Maria, 2013; Forman & College, 2019). Relationships between teachers and students are also perceived to be significantly associated with classroom interactions and child outcomes (Saft & Pianta, 2001). Identifying the challenges teachers encounter in managing the various curriculum elements at their school can be facilitated by assessing the constraints encountered during the implementation process (Wan Aziz, 2014). The correlation between Knowledge and RSE Input is 0.024, suggesting that higher levels of RSE Input may be associated with slightly higher levels of knowledge, but this relationship is not very strong. Indeed, the limitation shows that on the implementation of RSE by teachers. Twelve years old children tend to receive less RSE input compared with 11 years old and 10 years old children. It assumes that at 12 years old, teachers and students might focus more on the examination than sharing road safety knowledge in classes.

The third objective reveals a significant main effect of age on knowledge. In contrast, age is often considered the most crucial factor in determining road safety knowledge, and this belief offers an intriguing insight into the relationship between driving behaviour and experience. Younger drivers often experience rates of accidents compared to drivers (Arafa et al., 2020). Conversely older individuals tend to possess an awareness of road hazards due, to their extensive driving experience (National Safety Council, 2012). Nevertheless it is crucial not to attribute ones level of knowledge in road safety to age. However the influence of age, on knowledge highlights the significance of learning and ongoing education. Therefore it is crucial to tailor road safety education to the age and developmental level of the students. For younger students, it may be helpful to use interactive and engaging teaching methods to increase their knowledge and interest in road safety. When dealing with students it might be more impact to offer real life instances and case studies that demonstrate the repercussions of driving. Additionally the research reveals that age does not have an impact, on behavior implying that immaturity is not related to the issue at hand.

Risky behaviours can stem from many factors, and age is often believed to be a determining factor in road safety. However, research suggests that age may have a minor impact on road safety behaviour than previously assumed. Durkin and Tolmie's (2010) study found no clear correlation between age and unsafe driving behaviours. The literature review conducted in "The Development of Children's and Young People's Attitudes to Driving" highlights the importance of considering developmental issues when analysing risky driving behaviours. This includes learning about risk, adolescent brain development, perception of risk, emotion regulation, and multiple risk-taking tendencies in adolescence. All these factors contribute to how individuals perceive threats versus perceived benefits when making decisions while on the road. Therefore, it is essential to consider all these aspects when addressing the issue of unsafe driving behaviours rather than solely relying on an individual's age.

Throughout their early years, children are highly receptive to learning and tend to observe the conduct and actions of their parents, which can significantly impact their attitudes towards road safety (Alonso et al., 2018). Parents have a crucial role in all three aspects of the IMB model. They can provide accurate information about traffic laws, the risks of distracted driving, and the significance of wearing seat belts. Moreover, parents can motivate their children by highlighting the importance of responsible driving practices and the potential consequences of reckless behaviour. The influence of parental driving behaviour on a child's development can be beneficial and detrimental. For example, suppose parents demonstrate safe driving habits like following speed limits and adhering to traffic rules. In that case, these behaviours may rub off on their children and instil an appreciation for safe driving practices. Based on the study's findings regarding the impact of age on road safety knowledge and behaviour, it becomes evident that teachers play a role in fostering safe practices. Although age has a role to play, it is ultimately the teachers who are responsible for ensuring that road safety education evolves alongside students' developmental stages. Teachers can employ engaging teaching methods for students to instil foundational road safety knowledge that will grow with them. Teachers can use practical examples and case studies to reinforce the consequences of unsafe driving behaviours when dealing with students. This study challenges the notion that age alone determines road safety behaviour, emphasising that teachers should guide students in understanding influences at play. Factors like attitude towards driving, exposure to driving situations and personality traits can be highlighted by teachers through discussions and insights, equipping students with an understanding of their choices on the road. Therefore teachers not knowledge but also empower students with critical thinking skills and awareness necessary for responsible road behaviour throughout their lives.

### **Implication and Recommendation**

The research offers a comprehensive and forward-thinking perspective on road safety education and behavior. By emphasizing the significance of psychological factors beyond age, including personality traits, attitudes, and peer influences, the research provides a valuable framework for designing effective road safety programs. Moreover, it underscores the importance of personalized, lifelong learning approaches that consider the unique needs of students at different developmental stages. The inclusion of teachers as role models and collaboration with parents are highlighted as crucial components of successful road safety education. This research's interdisciplinary approach, drawing on expertise from road safety, psychology, and education, further enhances its significance in contributing to a more holistic understanding of road safety behavior. As such, it provides essential guidance for policymakers, educators, and practitioners aiming to create impact road safety initiatives that address the complexities of human behavior on the road.

### **Conclusion**

The study results suggest that Road Safety Education (RSE) programs have a statistical influence on the behaviours reported by children. This highlights the necessity for producing and strengthening actions to be implemented in RSE-related interventions, considering demographic factors such as age and articulating them with the educational system. The study found that RSE-related variables and demographic factors such as age affect the road behaviour of children and young people. Behaviorally-based interventions related to road safety education may improve the children's future road behavioural outcomes and, thus, their pedestrian safety.

### Statements and Declarations

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