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Associations of Children's Active School Travel with Perceptions of the Built Environment: Preliminary Study

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Abstract--- *Walking is a healthy way for children to explore the environment and enable them to be more independent. However, nowadays, children prefer using passive mode of transport to commute to school. Hence, it is essential to know the built environment factors that influence children to choose walking as a mode of traveling to school. This study identifies and evaluates the built environment factors that contribute towards children's preference when walking to school. This study, therefore, investigates children's preference through the school children themselves to understand their perceptions on the choice to walk to school. Through a case study method, 100 primary school children who walk to school in Sekolah Kebangsaan Seksyen 7, Shah Alam were selected as respondents. The survey included inquiries on children's background and the homeschool path provisions in terms of quality of pedestrian facilities and surrounding environment. Observation survey also were conducted to identify the availability and conditions of several built environment elements in the study area. Hence, the result of this study will assist town planners when planning for pedestrian specifically for primary school children.*

Keywords--- *Active Travel Mode, Transport, Walking, Primary School Children.*

I. INTRODUCTION

Walking to or from school is one of the ways of active commuting that can make a crucial contribution to the children in term of increasing the physical activity levels(1–5). Compared to those who are driven to school, school children that walk to school are more active in terms of their physical.

However, in the recent decades, the percentage of students walking to school has fallen(6). As in Malaysia, due to some limitations, not all children are willing to walk to or from school. The constraints are referring to some of the factors of social-ecology, including personal, social, and built environmental factors. Safety has also become one of the key factors that affected the children's decision to walk to or from school. A consistent decline in an active school transport among Malaysian children has drawn attention to the safety and well-being of children. As a result, the factors causing children to walk to school have been examined by an emerging literature. To date, there are several studies have examined personal, social and built environmental factors associated with active transport to school (4,5). Yu also noted that in general, built environments have been analyzed for their potential to promote population level-changes in the direction of more physically active behaviors, including increased use of walking by school children for school trips.

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Many researchers have recognized that the built environmental factors play an important role in facilitating Active School Travel (walking to/from school). The presence of infrastructure for walking (e.g., Sidewalks, pedestrian crossings and controlled traffic crossings) were found to be associated with Active School Travel (7). The effect of built environments on the walking activities among school children can be even greater. This is because younger aged especially children are more vulnerable to the dangers and are subject to challenge in built environments.

This study, therefore, aimed to examine the built environmental predictors that influence the children walking to or from school. To be mentioned, this studyprimarily focused on walking activities among primary school children. Although parents are the ones who determined their children's mode of travel to school, but this study will identify the preference of school children itself inthe decision to walk to school.The purpose of this study was to better understand built environmental factors that influence walking to school with primary school children.

Consequently, the results of this study will assist the government in developing a plan, guidelines and policy specifically for school children as an effort to encourage them towards sustainable practices through the use of non-motorized vehicles and active transport that can effectively minimize common traffic an environmental issue such as traffic congestion and air pollution. Also, it has encouraged walking to school as one of the means to increase the physical activity and energy expenditure of children (5). It is therefore important to ensure that the recommendation takes into account our society's changing needs by providing a good pedestrian environment and user-friendly environment that considering all the factors that have been studied and also meets the children's needs and conformity.

II. BUILT ENVIRONMENT IN RELATION TO WALKING TO SCHOOL

Problems of safety and security have prevented parents from promoting the use of sustainable transport. Referring to the statistics reported by(8), the death rate for pedestrians in Malaysia was 562 deaths per year where this number made pedestrians the third highest among road users involved in road accident fatalities. It is evident that more efforts are required to minimize the steep development ofpedestrian casualties while using the road.

A systematic review was performed of relevant literature to identify variables to be considered for the questionnaire survey that linked to walking to school.According to(9), sidewalks, crosswalks, and street accessibility were correlated with more frequent active children's transportation. One of the key determinants of successful travel to school is the commuting distance from home to school. In the study conducted by (3), it was reported that there are other factors that need to be considered as an influencing factor for children walking to school such as access to destination, recreational facilities, public transportation, the availability of sidewalks and traffic lights or pedestrian crossing, all of which documented positive association with children's physical activity. Whereas, transport related factors (number of road crossings, traffic density and speed), neighborhood crime and area poverty are inverted (3). Here, it can be concluded that the characteristics of physicalenvironmental were among the crucial interpreters of active commuting in children (3).

There are several characteristics listed under built environmental factors that are very significant and need to be addressed as it affects the children who walk to school. The distance from home to school is one of the major

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barriers for children walking to or from school, as(5)have described, as well as the dimension of pedestrian infrastructure such as the availability and quality of the sidewalk. In addition, in this paper, it also reported that other factors such as the existing land uses on the way to school, the prevalence of physical barriers to walking and overall walking environment also lead to significant impacts for the walking children.

III. METHODOLOGY / MATERIALS

This study used a method of questionnaire survey by distributing a set of questionnaires to 100 primary school children in Sekolah Kebangsaan Seksyen 7, Shah Alam. The study area was selected as a case study area due to its location which is situated in an urban area and create high traffic volume during peak hour. The survey was conducted by trained researchers who were assigned to help distributing the questionnaires to the school children. Participants were initially recruited and assessed throughout the month of August 2019. In total, 100 primary school children were recruited to the initial study where itinvolved71 male students and 29 female students.

A total of 100 respondents was involved in questionnaire survey which consists of primary school children who walk to or from school. This study was using a different approach from previous studies which used primary school children as targeted respondents instead of asking their parents to get the information on their children as what have been done in previous studies. For this study, the eligibility to participate in the study are thoseprimary school children, aged from 6 to 12 years old who walk to or from school only. The respondents were selected through convenience sampling method. Samples were calculated based on the data on children walking to school provided by the Senior Assistant of Student Affairs.

In terms of the construction of the questionnaire, there are several questionnaires adapted from the previous studies. The questionnaire from(5) was used as a reference. The existing literature review wasalso studied. As a result, from considering both references mentioned, the questionnaire consists several important aspects to be studied, which are divided into several sections which are Respondent Profile, Attitude and Preference, Sidewalk Availability and Quality and Walking Environment. Categorical and Likert Scale questions are used to ask school children how much they agreed or disagreed with every argument included in the questionnaire survey.

Thus, this study explored these following research questions:

Research Question 1:Is there is a significant difference between Genders (Male and Female) on Quality of Pedestrian Walkway?

Research Question 2: Do built environments have significant impacts on walking to school?

The answers to these questions will help to better understand the impacts of built environmental interventions on children’s walking to school.

Referring to Table 1, the study had questions on several subjects. These subjects were investigated because these were the factors that were theoretically discovered influencing preference for children when walking to school. The questionnaire was constructed using closed-ended questions and Likert scale questions. Table 1 demonstrates the detail of all sections.

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Table 1: Questionnaire Design

Variable	Measurement
Respondent Profile	
Age	
Gender	(0 = male, 1 = female)
Address	
Attitude and Preference	
I love walking compared to riding vehicle	(0 = yes, 1 = no)
Walking to school is fun	(0 = yes, 1 = no)
I am walking to school because the house distance to school was close	(0 = yes, 1 = no)
My parents asked me to walk to school	(0 = yes, 1 = no)
Walking to school saves me time	(0 = yes, 1 = no)
Walking to school can be good for my body	(0 = yes, 1 = no)
Walking to school is easy and comfortable	(0 = yes, 1 = no)
Frequency of walking to school in a week	(1 = rarely, 2 = sometimes, 3 = almost always, 4 = always)
Pedestrian size group	(0 = alone, 1 = in group)
Walking with whom	(0 = friends, 1 = sibling, 3 = parents, 4 = guardians, 5 = no)
Sidewalk Availability and Quality	
Are there sidewalks along your way to school?	(1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree)
Sidewalks are well maintained and clean	
Sidewalks are wide enough for two persons walking together	
Sidewalks are separated from traffic by grass or trees	
Some sidewalks are blocked by trash cans, power poles or cars	
The parents' vehicles waiting outside the school greatly interrupted my journey	
Walking Environment	
It is well maintained and clean	(1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree)
It is well shaded by trees	
It is quiet (without much noise from surrounding)	
There are nice things to see	
Streets are well lit	
School zones are well enforced	
Hot weather bothers me while walking	

IV. RESULTS AND FINDINGS

The study had revealed several important discoveries based on the questionnaire survey. IBM SPSS Statistics was used to test the descriptive statistics of each variables tested as shown in Findings section.

4.1 Results and Discussion from Questionnaire Survey

A. Primary School Children's Characteristics Background

The first part of this chapter will discuss the results of respondent profile. Based on the Table 2, it showed that the number of children aged from 10 to 12 years old (n=80) is more than the number of children aged 6 to 9 years old (n=20). This indicated that age affects children to walk to school as their age increases, parents are bolder to encourage children to walk to school and the children themselves are confident enough to walk to school.

For the gender characteristics, the number of male students (n=71) is more than the female students (n=29). This clearly indicated that male students were more involved in active transport (walking) compared to female students. Based on this finding, it can be said that male students are more involved in active school travel compared to female

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students. The results also supported by the previous study conducted which found that boys to be more active and more likely to walk than girls (10).

Table 2: The Age and Gender Relationship

Variable	Measurement	Percentage
Age	6 to 9 years	20
	10 to 12 years	80
Gender	Male	71
	Female	29

Table 3 shows the relationship between travelling distance and the frequency of children walking to school. Travelling distance is the distance measured from home to school, which is obtained from asking the children the address of their home. Based on the table, it is clearly indicated that 82% of respondents live between 500 meters to 1 kilometer away from school. This followed by 9% of children living more than 2 kilometers away from home. There were 6% living less than 500 meters and only 3% of children living in 1 kilometer to 2 kilometers away from school. Here, it can be concluded that the majority of primary school children can walk until 1 kilometer only and those who live more than 1-kilometer distance, they tend to use a private vehicle (parent's vehicle) and public transport to commute to school. This result meets the standard stating the minimum distance between the neighborhood area and the school is less than 800 meters from the (11).This conforms the guidelines in terms of distance. This result also fulfills the criterion established by (12) that specified that a limit of one quarter mile walking distance within the neighborhood should be the catchment area for elementary schools. the catchment area of the elementary schools should be a maximum of one quarter mile of walking distance within the neighborhood. It is about inspiring children to walk to school.

In terms of frequency of student walking to school, it shows that no significant difference between four types of frequency. The majority of school children (29 students) almost always walk to school in a week, followed by 25 students that sometimes walkto school. This finding shows that only 53 students are using Active School Transport (walking) to school. The rest are still using private vehicles and public transport to school. It can be inferred that all respondents were classified as active travelers as described by (9) that those who walked to or from school 1 day/ week were active travelers.

Besides, Table 3 shows that 24 students that living within 500 meters to 1 kilometer away from school almost always walk to school. This shows that the students that use active travel to school, mostly those who are living within the distance of 500 meters to 1 kilometer from the school.

Table 3: The Relationship between Travelling Distance from Home to School and the Frequency of Children Walking to School

Travel Distance	**Walking Frequency (In a Week)**				**Total (%)**
	rarely	**sometimes**	**almost always**	**always**	
Less than 500 meters	0	1	3	2	6
500 meters to 1 kilometer	18	20	24	20	82
1 kilometer to 2 kilometers	0	2	1	0	3
More than 2 kilometers	4	2	1	2	9
Total	22	25	29	24	100

Pearson Chi-Square, χ, = 9.213 Significance value, p = 0.418

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B. Built Environmental Factors

Built environmental factors is one of the factors that is important to be considered in order to know the factors influencing primary school children to walk.

For the qualities of pedestrian facilities, the majority of students were satisfied by answering agree and strongly agree for all the statements. First statement mentioned on the maintenance and cleanliness of the sidewalk where recorded mean of 3.79. It shows that students satisfied with the existing condition of the sidewalk facilities. The facilities were all well maintained and clean, thus students are comfortable to walk along their journey to or from school. Based on Table4, 4.48 means was recorded for the width of the sidewalk where it is enough for two persons to walk together. Wider space is an important criterion need to be considered so as to allow children to have company beside them instead of walking alone. For the sidewalk's separation from traffic, it was recorded a low mean which is 2.80 which indicates that the separation is not fully provided along the way from home to school. In terms of blocking the way of the sidewalks, the majority of respondents agreed and strongly agreed that the walking path is not blocked with permanent and non-permanent things such as trash cans, power poles or cars. So, the pedestrian has no interruption along their journey to school.

Table 4: The Quality of Pedestrian Facilities

Quality of Pedestrian Facilities	**1**	**2**	**3**	**4**	**5**	**N**	**Mean**
Sidewalks are well maintained and clean	13	16	-	21	50	100	3.79
Sidewalks are wide enough for two persons walking together	3	4	-	28	65	100	4.48
Sidewalks are not separated from traffic by grass or trees	17	21	7	35	20	100	2.80
Some sidewalks are not blocked by trash cans, power poles or cars	5	6	8	29	52	100	4.17

*1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree

An independent-samples t-test was conducted to compare between the quality of pedestrian facilities and gender categories (male and female) as shown in Table 5. There was no significant difference in the quality of pedestrian facilities between male (M=4.00, SD=0.780) and female (M=3.70, SD=0.919) conditions; $t(98) = 1.646$, $p = 0.103$. These results showed that gender does not have an effect on the quality of pedestrian facilities at 0.05 level of significance.

Table 5: The Quality of Pedestrian Facilities

Gender	**N**	**Mean**	**SD**	**t**	**p**
Male	71	4.00	0.780	1.646	0.103
Female	29	3.70	0.919		

The environment surrounding the pedestrian facilities also gives a great influence in the decision of school children to walk to school. Referring to Table 6 majority of students were not satisfied by answering disagree and strongly disagree for most of the statements. The mean recorded for shaded tree was only 2.87. Since the study area (Sekolah Kebangsaan Seksyen 7) is situated in the urban area with high volume of traffic, thus, most respondents disagreed with the argument that this area is quiet without much noise from the surrounding area.

The mean recorded is only 1.86. The noise from vehicles that passed by on the road really interferes another vulnerable road user. The surrounding area of the study area consists of residential development and several units of commercial area only. That is the reason why the mean recorded for nice things to see is only 2.63.

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The majority of respondents were agreed with the lighting provision in the study area and recorded 3.92 for mean. Highest mean was recorded by enforcement within school zones which recorded 4.04 for the mean. During the peak hour (start and end of school hours), security guards are responsible for controlling the road in front of the school.

Table 6: The Environment of Pedestrian Facilities

Quality of Pedestrian Facilities	1	2	3	4	5	N	Mean
It is well shaded by trees	34	14	7	21	24	100	2.87
It is quiet (without much noise from surrounding)	61	18	5	6	10	100	1.86
There are nice things to see	49	5	6	14	26	100	2.63
Streets are well lit	19	3	2	19	57	100	3.92
School zones are well enforced	15	3	3	21	58	100	4.04

*1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree

An independent-samples t-test was conducted to compare between the environment of pedestrian facilities and gender categories (male and female). There was no significant difference in the environment of pedestrian facilities between male (M=2.99, SD=1.15) and female (M=3.23, SD=1.15) conditions; t(98) = -1.007, p = 0.316. These results revealed that gender does not have an effect on the environment of pedestrian facilities at 0.05 level of significance.

Table 7: The Environment of Pedestrian Facilities

Gender	N	Mean	SD	t	p
Male	71	2.99	1.145	-1.007	0.316
Female	29	3.23	0.906		

4.2 Results and Discussion from Observation Survey

The observation survey was conducted to classify the availability and conditions of all the elements in the study area. (9)in his paper outlined several characteristics under built environmental factors which was used as a basis and it is stated as in Table 8.

Table 8: Checklist for Observation Survey

Characteristics	Measurement
Primary land use	(0 = residential, 1 = other)
Sidewalks	(0 = none, 1 = continuous on one side, 2 = continuous on both sides)
Curbs	(0 = none, 1 = continuous on one side, 2 = continuous on both sides)
Green strip between sidewalk and street	(0 = no, 1 = yes)
Trees	(0 = few/some, 1 = many)
On-street parking	(0 = none, 1 = on one side, 2 = on both sides)

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Table 9: Results for Observation Survey

Characteristics	Existing Condition	Photos
Primary Land Use	The land use type in this area consists of residential, commercial and facilities.	 Residential  Commercial Unit
Sidewalks	Sidewalks are provided in the study area and are continuous on both sides. The sidewalks are fitted with roofs and fences to make the pedestrian comfortablelduring the walking journey. The sidewalks are well maintained and clean.	 Sidewalk
Curbs	Sidewalks are paved footpath alongside a road. The sidewalk is raised above the level of the road. The curbsare concrete edging between the road and the sidewalk.	 Curb
Green strip between sidewalk and street	There is no green strip between sidewalk and road. Sidewalk and road are distinguished by the level of height, which the level of sidewalk is higher than the road.	 No green strip between sidewalk and street
Trees	There are many shaded trees along the sidewalk facilities.It can be said that the sidewalk is well shaded by trees. In some areas that do not have trees, the sidewalk is fitted with roofs.	 Trees along the sidewalk
On-street parking	There are no marked parking facilities provided in this area. It is considered as illegal parking where parents parked their vehicle in this area. They do not interfere the sidewalk facilities as the level of the road and sidewalk are not at the same level. Parked cars can also serve as a buffer between the sidewalk and the road.	 Car parking besides the sidewalk

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V. CONCLUSION

Based on the findings, it clearly shows that distant influence the decision of school children to walk to school. As(10)said, distance to school is a major barrier to walking. When distance from home to school increased, there is also a decreased probability of walking to school, according to(10). The finding suggests that distance to school, poor quality of pedestrian facility and poor surrounding environment in facility area prohibit children's active commuting to school. It also has important implication on safety walking environments.

In terms of the design aspect, the study revealed that gender does not influence the design of the pathway. However, most children considered the quality of pedestrian walkway as a criterion compared to the environment of pedestrian facilities.

This research provided important in-depth knowledge of the effect of built environments on children's walking to school behavior. Findings from this research have important implications in potential initiatives as it encourages walking amongprimary school children. This study focused on the urban area; thus, future research should include rural communities as well in order to understand the significance.

In summary, an effort to promote walking to school among school children requires long-term planning and coordination not only restricted to school, but it involved from multiple level as well such as policy changes, environmental interventions and educational programs. Engagement among all related parties, will create a more walkable environment for schools, and it is one of the attempts to make parents and children willing to choose walking as their means of transportation to and from school.

As a conclusion, built environment characteristics that considering safe travel aspect is really important and necessary to be provided in order to encourage the active travel mode among school children. (9) in his paper stated that a wider variety of design characteristics may be influenced the active travel to school among adolescent.

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