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An Assessment of CPTED Principles in Relation to Bullying Behaviour*

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Abstract

This paper presents a preliminary study examining the potential influences of building design on bullying behavior and experiences, of a sample of Malaysia secondary school students. Bullying in school may be an early stage of the developmental sequence that serves as a strong predictor of delinquency and future crime. Through the discussion of findings in previous studies, environmental design approach is as one of the methods to bring down the level of crime in school. Crime Prevention through Environmental Design (CPTED) is an approach that uses environmental design as a tool to reduce crime from both the physical and the psychological aspects. The features of physical environment such as street layout, building design, lighting and physical decay can affect the occurrence and behaviour of criminals. The shortcomings in the physical environment could open up the opportunity for offenders. Thus, this study seeks to determine if there is a possibility that the actual physical environment in which students spend greater part of their day can affect behaviour, which in turn, can lead to violence in school. A survey was conducted at four secondary schools in Shah Alam, Selangor with a random sample of 406 students from Form 1, Form 2 and Form 3 involving the observation of 32 school blocks. Three principles of Crime CPTED were analyzed in the school environment. The results indicated that there is a significant difference in territoriality and school maintenance which results in the forming of the negative environment in the schools. It was found that this, in turn, affects the frequency of bullying occurring among the students in school.

Keywords

School, Bullying, CPTED, Physical Environment

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1. Introduction

The quality of school life among the children in the school is disturbed by the phenomenon of bullying, and it has been recognized as a serious problem among the school society (Berthold & Hoover, 2000). Bullying can be defined as negative actions that repeatedly occur over a period directed against another student who has difficulty in defending himself or herself (Olweus, 1994; Wan Ismail, et al., 2010). From past research, at least 5 percent of the students in both primary and secondary schools were bullied weekly or more often in North America, Australia, Japan, Scandinavian countries and several countries in Europe (Roland & Galloway, 2002). The United States Department of Justice and the National Association of School Psychologists (NASP) estimated that 160,000 children missed school each day due to the fear of the bullies (Newman-Carlson & Horne, 2004). In the year 2013, approximately 3 percent of students aged between 12 and 18 years old are reported afraid of being attacked or harmed at school or on the way to and from school (Robers, Zhang, & Morgan, 2015).

Malaysia also does not behind from this phenomenon, and it has been a concern, especially for parents. Malaysia is a country with multi-ethnic, multicultural, and multilingual society. It is a country with the majority in Muslim, with significant Buddhist, Christian, Hindu religious minorities also being present. The nature of secondary education system in Malaysia is categorized into three types which are National Secondary School, National Type Secondary School and Secondary Technical and Vocational School. In addition, there are also schools which specifically for single-sex. As for National Secondary School, there is a mixture of ethnic, gender and linguistic in school. The average size of schools regarding student enrolment is 35 to 40 students per class. In 2017, it was reported Selangor had recorded as the highest number of "hotspot" school for bullying cases as many as 76 schools, followed by Johor (63), Negeri Sembilan (40), Pahang (37) and Pulau Pinang (37) (Bernama, 2017). Until Jun. 2017, it was recorded 872 bullying cases occurred in the school (Raja Zaid, 2017). Recently in Jun. 2017, two students were dead because of bullying. One of the students had been beaten extremely using a belt, rubber pipe and hanger including abused using steam iron (80% body burns). The abused lasts up to two days.

Traditionally, bullying has not been viewed as a criminal act and has either been ignored or treated as a disciplinary matter in schools. In the meantime, there is no implementation of strong national policy that is fighting for school bullying, and the issues are left to individual schools. However, Malaysia government is in all effort to combat bullying in school. The victims apparently helped and supported by school counseling. The perpetrator will be dealt with criminal law and if serious can be expelled from school.

Bullying makes the lives of its victims miserable. It undermines their confidence and destroys their sense of security. It can also affect children and young people's attendance and progress at school. And there's evidence that, for some people, being bullied regularly as a child can also be linked to emotional prob-

lems that considered a serious problem among the victims which included high levels of anxiety, depression, (Hawker & Boulton, 2000; Nakamoto & Schwartz, 2010; Reijntjes Kamphuis, Prinzie, & Telch, 2010; Ken Rigby, 2003) and suicidal thinking (Rigby, 2003; Sourander, et al., 2011).

The previous researchers mostly focus on the larger scope which in neighbourhood context. A review of 122 evaluations of crimes prevention project by Poyner (1993) indicated that over half of the area of environmental design (24 out of 45) demonstrated the reduction of crimes. The evaluation was focused on lighting, fencing, design changes to improve surveillance opportunities, the cleanup of neighbourhoods, street changes, wider market gangways, electronic access control and modification. CPTED is an increasingly current approach and is being implemented on a global scale (Cozen, et al., 2005). Researched by Rasidah, Johari, Najib, & Salleh (2012) had shown high CPTED practices are able to reduce the fear of crime in the neighbourhood area. However, the crime in school should be noted as a serious problem as it could lead to criminal activity in the future (Andershed, Kerr, & Stattin, 2001; Min, et al. 2011; Olweus, 2011; Renda, Vassallo, & Edwards, 2011; Sourander, et al., 2011). Although physical environment is considered to be an important factor that affects crime in school in environmental criminology, there is not much of research in school crime context on how environmental approach may help in reducing school crime and increasing safety in school. Wilcox, Augustine, and Clayton (2006) had studied on physical environment and crime in Kentucky Schools. Differently, with Wilcox method which is the observation was more focus on an element in the main office, this paper method was more focus on an element in each building in school. Thus, this paper seeks to determine in a school context if there is a possibility the actual physical environment in which students spend the greater part of their day can affect behaviour, which in turn, can lead to school violence.

2. Literature Review

2.1. Definition of Bullying and Types of Bullying

Bullying can be defined as negative actions that repeatedly occur over a period directed against another student who has difficulty in defending himself or herself (Olweus, 1994.; Wan Ismail, et al., 2010). Negative actions referred to behaviour that was intended to inflict harm, injury, pain, or discomfort upon another individual (Atlas & Pepler, 1998). Meanwhile, Atlas & Pepler (1998) defined bullying as a form of social interaction in which there was an implied imbalance of power or strength in the interaction. The power of imbalance in bullying may not be limited to physical size and may be presented in the tone of voice, the physical stance of a bully or the number of children take part as bullies and the support of peers who were involved (Atlas & Pepler, 1998). Wi et al. (2009) defined bullying as repeated, ill-negative behaviours by one or more students directed against a student who has difficulty defending himself or herself. Therefore, bully will take places when there are imbalance powers between another

people with negative action and has difficulty to defend on their own. Bullying behaviour may take many forms such as physical, verbal, (Olweus & Mortimore, 1993) and relational or social (Crick, et al., 1995). Physical bullying, such as hitting, pushing and kicking, and verbal bullying, such as name-calling and teasing in a hurtful way, are usually considered to be a direct form, while relational bullying refers to an indirect form of bullying, such as exclusion and spreading rumors (Espelage, Bosworth, & Simon, 2000; Wang, Iannotti, & Nansel, 2009). Verbal bullying was the most widely performed type of bullying (Boulton, Trueman, & Flemington, 2002; Mohamad Salleh & Zainal, 2014; Rigby, 2008) that can be done quietly and covertly where the children are able to avoid detection and punishment (Atlas & Pepler, 1998). Boys were more involved in physical bullying, whereas girls were involved in relational bullying (Wang, et al., 2009).

2.2. Delinquency and Physical Environment in School

Creation of safe school environments has become a focus of prevention and intervention efforts in response to problems of bullying in schools. The sense of safety from any danger and perpetration is one of the important aspects that drive the quality of life of students. Feeling safe is important for a student to have a positive learning environment in school. Feeling of unsafe in school impacts mental health, absenteeism and academic success among the bullied (Hughes, Gaines, & Pryor, 2014). Schools encounter vulnerabilities to their safety and security in four major areas; 1) the design, supervision and use of school space (Astor, Meyer, & Behre, 1999; Durán-Narucki, 2008; Grana, et al., 2010; J Waller 2013; Kumar, M. O' Malley, & D. Johnston, 2008; Wilcox, et al., 2006), 2) the administrative operations and practices of the school (Vidourek, King, & Merianos, 2016) 3) the neighbourhoods and surrounding communities served by the school (Bowes, et al., 2009; Lee & Ha, 2015) and 4) the behavioural characteristics and histories of the students who are enrolled in the school (Atlas & Pepler, 1998; Farrington & Ttofi, 2011; Mohamad Salleh & Zainal, 2014).

As per mention, crime also is believed to be related to the physical environment (Liebermann & Kruger, 2004) as it plays an important aspect in the developing behaviours (Durán-Narucki, 2008). Some places in school are more exposed to crime than others because of inappropriate physical design, layout (Newman, 1972) and overlooked of unused spaces. The opportunity that exists due to lack of design, supervision and use of school space and environment encourage a criminal to act on a targeted victim (Liebermann & Kruger, 2004).

Ecological theories of crime had suggested that both social and physical characteristics can affect the crime (Shaw, 1942). The built environment is believed to be one of the factors influencing crime and the level of fear of crime in society (Sakip, Johari, & Salleh, 2012). According to Poyner (1983), human movement and behaviour are critically affected by the design and layout of the physical environment. Through daily interactions with the physical and social environment, individuals learn about their places in society, their value, appropriate and inap-

propriate behaviour (Durán-Narucki, 2008). The role of physical environments such as street layout, building design, lighting and physical decay can affect the behaviour of crime (Wilcox, et al., 2006). Some places are more exposed to crime than others because of inappropriate physical design, layout (Newman, 1972) and overlooked of unused spaces. Crime is believed to be related to the physical environment (Liebermann & Kruger, 2004) as it plays an essential aspect in the developing behaviours (Durán-Narucki, 2008). The opportunity that exists in an environment encourages a criminal to act on a targeted victim (Liebermann & Kruger, 2004). In deciding whether or not to commit an act of crime, the environmental element is one of the factors considered by criminals (Anastasia & John, 2007).

From the previous study, regarding school crime and influence of environmental design, they had study on physical features (Wilcox, et al., 2006), lighting (Lee & Ha, 2015), land used (Lee & Ha, 2015; Wilcox, et al., 2006), neighbourhood physical environment (Wilcox, et al., 2006) and building condition (Durán-Narucki, 2008; Kumar, et al., 2008) in school environment and it affect student behaviour. According to Skogan and Maxfield (1981), in Melde & Esbensen (2009), the environment such lacks of maintenance as poorly kept buildings and unsupervised referred as "sign of crime", and people tend to fear with this environment which may develop a reputation for high levels of criminal behaviour. Several factors in the physical environment are perceived to impact on fear of crime including visibility and signs of neglected (Lee & Ha, 2015; Lorenc, et al., 2013). Dirt, decay, graffiti, litter and other sign of neglect of the environment are seen as drivers of fear (Lorenc, et al., 2013; Wilcox, et al., 2006). A proper surveillance and lighting at night are able to improve the visibility of the area thus reducing the fear of crime (Kitchen & Schneider, 2007; Perkins, Meeks, & Taylor, 1992) as to create visual clarity to the surrounding area. Although most exterior spaces of elementary schools are high-visibility areas, the hottest spots were behind the areas of the building which were low in visibility (Lee & Ha, 2015). A place which is not visible because of isolated which are obstructed by landscaping and building design are believed to increase the risk of attack, and hence fear (Lorenc, et al., 2013). Certain "hot spots" that indicated to be un-owned spaces such as hallways, dining areas, and parking lot where are the sights of more crime event and greater fear among students (Astor, et al., 1999). Astor, et al. (1999) claimed the presence sense of ownership of these locations has the potential to decrease the prevalence of victimisation in schools drastically. A good maintenance strategy directly impacts the fear of crime due to awareness of responsibility and caring for the targeted crime. It allows for the continued use of space for its intended purpose.

Studies by Shamsuddin, Bahauddin, & Aziz (2012) had indicated a relationship between the outdoor physical environment of the school and the students' social behaviours. However, the limitation of this research is not to evaluate the negative social behaviour related to schools environment. Certain "hot spots" that indicated to be unowned spaces are where the sights of more crime event

create greater fear among students (Astor, et al., 1999). The presence sense of ownership of these locations has the potential to drastically decrease the prevalence of victimization in schools (Astor, et al., 1999). Through these studies, victimisation occurs most likely when the adults are limited in their abilities to monitor. The school structure may play an important part in giving a chance for individual children to involve in bullying behaviours (Atlas & Pepler, 1998). Craig, et al. (2000) reported that victimisation is most likely to occur in less structured environments. Studies showed that lower rates of school victimization were associated with the school safety interventions that are focused on improving the physical environment of the school (Johnson, 2009). Johnson (2009) concluded that physical environment appears to offer intervention opportunities to reduce school victimization.

2.3. Crime Prevention through Environmental Design (CPTED) as an Approach to Decrease Bullying Cases

Crime Prevention through Environmental Design theory promotes a sense of safety and decrease the incidence of crime in any given environment by reduction of opportunities for crime to occur. This reduction is achieved by employing physical design features that discourage crime, while at the same time encouraging legitimate use of the environment. It is an approached from both the physical and the psychological aspects at the same time. There is a growing body of research that supports the assertion that crime prevention through environmental design is effective in reducing both crime and fear of crime in the community (Cozen, Saville, & Hillier, 2005). CPTED focuses on the relationships between people and environment. The behaviour and movement of human were significantly affected by the architectural design and layout of the physical environment (Poyner, 1983). The crime patterns due to human behaviour and daily routine were determined by environmental design factors (Felson, 2006). There are four principles in CPTED which is territoriality, surveillance, maintenance and access control. A review of 122 evaluations of crimes prevention project by Poyner (1993) indicated that over half of the area of environmental design (24 out of 45) demonstrated the reduction of crimes. The evaluation was focused on lighting, fencing, design changes to improve surveillance opportunities, the cleanup of neighbourhoods, street changes, wider market gangways, electronic access control and modification. CPTED is an increasingly current approach and is being implemented on a global scale (Cozen, et al., 2005). Researched by Rasidah, Johari, Najib, & Salleh (2012) had shown high CPTED practices are able to reduce the fear of crime. Noted that improved territoriality, indicated school ownership, and improved surveillance are essential factors to a better perception of safety in school (Wilcox, et al., 2006).

Crime Prevention through Environmental Design (CPTED) is one of crime prevention that had been applied variously in the residential and commercial area. However, there is not much of research in school crime context on how

environmental approach may help in reducing school crime and increasing safety in school. Table 1 shows the previous study on safe school and physical environment that indicated to be the element of the CPTED principle. Thus, this study sought to help determine if there is a possibility the actual physical environment in which students spend the greater part of their day can affect behaviour, which in turn, can lead to school violence in secondary school in Malaysia.

3. Methodology

The site selection for the present study is based on the highest number of perpe-

Table 1. Previous study on safe school and physical environment.

Authors	Aim	Physical Environment					Result
		Land Use	Physical features	Use of Spaces	Lighting	Building Condition	
Astor, Meyer, & Behre (1999)	To identify the locations and times of the most violent occur			√			The violence occurred primarily in spaces such as hallways, dining areas, and parking lots at times when adults were not typically present. The spaces tend to be "unowned"
Wilcox, Michelle Campbell Augustine, & Richard R. Clayton (2006)	To test the link between the physical environment and crime within the school environment	√	√	√		√	Few features of the school or neighbourhood physical environment are associated with student-based measures of school crime/misconduct
Kumar, M. O' Malley, & D. Johnston (2008)	To examines various aspects of school physical characteristics relating to problem behaviour among students					√	Public schools are significantly more likely to have negative environmental characteristics than private schools
Grana, R. A., Black, D., Sun, P., Rohrbach, L. A., Gunning, M., & Sussman, S. (2010)	To examines the relationship between the level of school disrepair and substance use among students attending regular high school (RHS) and alternative high school (AHS)					√	Findings indicated that students attending AHS with greater school disrepair were more likely to report the use of marijuana and other illicit drugs (i.e., cocaine, heroin). Students attending RHS with greater school disrepair were less likely to report smoking cigarettes
Katherine J. Waller (2013)	To determine the relationship between level of school violence and school physical environment as perceived by teachers		√	√		√	The results of this study verified a significant relationship exists between the school environment and disruptive behaviours. There was no relationship found between the school environment and violent behaviours. Physical state of a school environment in terms of the age, state of repair, cleanliness, lighting, heating and cooling, etc., to impact the occurrence of disruptive behaviours as perceived by teachers
Lee & Ha (2015)	The relationship between visibility and fear of crime in environments using an automated quantitative analysis method			√	√		Locations for which fear of crime was reported had lower levels of visibility compared to locations not associated with fear of crime. The rear areas of buildings; areas located near newly built buildings; areas between buildings; curved or recessed walls; parking areas; and playgrounds were hot spots

Table 2. Crime index involved by students in Malaysia states.

No	States	Year						Total
		2010	2011	2012	2013	2014	2015	
1	Johor	148	95	57	379	299	169	1147
2	Kedah	234	1552	97	272	205	152	1112
3	Kelantan	190	130	94	199	133	105	851
4	Kuala Lumpur	108	106	125	147	165	94	745
5	Melaka	53	37	13	125	90	51	369
6	Negeri Sembilan	61	47	61	106	160	95	530
7	Pahang	77	56	56	165	173	87	614
8	Perak	127	84	90	210	146	114	771
9	Perlis	36	26	49	57	39	25	232
10	Puau Pinang	131	86	23	138	63	82	523
11	Sabah	115	60	51	120	76	55	477
12	Sarawak	121	69	82	137	104	115	628
13	Selangor	369	218	58	269	313	276	1503
14	Terengganu	92	64	95	159	107	67	584
	Total	1862	1230	951	2483	2073	1487	10086

Source: The Royal Malaysia Police Bukit Aman.

tration range from 7 to 18 years in crime index cases reported by police over five years ago from the year 2010 until September 2015. Table 2 shows for the past five years, crime index data in 14 states in Malaysia. The highest reported crime index involved by students were in Selangor as much as 1503 cases and followed by Johor 1147 cases and Kedah 1112 cases. Crime cases are higher in Selangor because Selangor is an urban city with high population density and infrastructure of the built environment. Urbanization has created many social problems and crime had become a common phenomenon in all urban area (Adel, Salheen, & Mahmoud, 2014; Ghani, 2017).

With the assumption of the number perpetration in school is linear with the number of bullying in school, Selangor is chosen as a location in this study. The selection of Selangor as site study is relevant due to the news reported in June 2017, the Ministry of Education had list as much as 402 schools nationwide which have been identified as having disciplinary issues among its students and Selangor states was recorded as highest bullying case and highest number of "hotspot" school (Bernama, 2017). Thus, Selangor states were chosen as the site study in this paper.

Thereafter, the data from the Selangor State Education Department was acquired to get the number of misconduct cases in Selangor district schools. Table 3 showed ten districts in Selangor, and Hulu Langat district was reported to be the highest contributors to the number of misconduct cases in Selangor

Table 3. Number of misconduct in Selangor district.

No	States	Year				Total
		2013	2014	2015	2016	
1	Sabak Bernam	767	328	945	881	2921
2	Gombak	3871	4723	7002	3473	19,069
3	Petaling Perdana	7085	9272	21,757	7437	45,551
4	Kuala Langat	2489	2573	2267	1807	9136
5	Sepang	2383	5395	2227	1545	11,550
6	Kuala Selangor	3845	4246	3785	3695	15,571
7	Hulu Langat	18,280	20,029	14,796	15,143	68,248
8	Klang	7066	8570	10,250	4104	29,990
9	Petaling Utama	3447	6682	51,363	2027	17,319
10	Hulu Selangor	3368	5065	7081	2948	18,462
	Total	52,601	66,883	75,273	43,060	237,817

Table 4. Type of bullying cases in secondary school in Hulu Langat District. Source: PPD Hulu Langat, Selangor.

No.	Type of Bullying	Year				Total
		2013	2014	2015	2016	
1	Verbal Bullying	13	8	11	26	58
2	Physical Bullying	55	66	81	124	326
3	Sign Bullying	-	-	8	4	12
4	Social Bullying	4	11	4	5	24
	Total	72	85	104	159	420

district with 68,248 cases followed by Petaling Perdana with 45,551 cases and Klang with 29,990 cases.

Lastly, bullying data was acquired from District Education Offices in Hulu Langat. Based on the data that had been obtained, there are 39 schools that under the management of District Education Offices Hulu Langat. Six schools are excluded from case study selection due to the factors of boarding school, national type school and government-aided schools. Only 33 of public school are included in the selection of site study. Based on Table 4, the bullying cases increase steadily for the past three years in Hulu Langat district's secondary school. In the year 2013, 72 cases of bullying were recorded and increased to 85 cases in the year 2014. The cases continue to increase in the year 2015 with 104 cases were recorded and keep on increasing to 159 until July 2016.

Table 5 shows list of secondary schools in Hulu Langat district corresponding with the bullying cases occur from 2013 until July 2016. Four schools are chosen for the comparison of the study. Two indicated to be highest in bullying cases which are SMK Bandar Rinching and SMK Taman Tasik. SMK Bandar Rinching

Table 5. Number of bullying cases in secondary school in Hulu Langat District. Source: PPD Hulu Langat, Selangor.

No.	List of School	Year			Total
		2013	2014	2015	
1	SMK Abdul Jalil	1		9	10
2	SMK Bandar Baru Ampang	8	2	5	15
3	SMK Bandar Baru Bangi	1	-	-	1
4	SMK Bandar Baru Sungai Long	-	-	-	0
5	SMK Bandar Damai Perdana	-	-	-	0
6	SMK Bandar Rinching	4	24	10	38
7	SMK Bandar Seri Putra	2	1	-	3
8	SMK Bandar Tasik Kesuma	5	-	1	6
9	SMK Bandar Tun Hussein Onn 2	-	5	5	10
10	SMK Cheras Jaya	1	1	10	12
11	SMK Cheras Perdana	-	-	-	0
12	SMK Dato Ahmad Razali	-	4	-	4
13	SMK Desa Serdang	-	5	-	5
14	SMK Dusun Nanding	-	2	5	7
15	SMK Engku Husain	-	-	1	1
16	SMK Jalan Bukit	9	2	13	24
17	SMK Jalan Empat	-	-	-	0
18	SMK Jalan Reko	2	1	3	6
19	SMK Jalan Tiga	2	1	2	5
20	SMK Kajang Utama	-	1	6	7
21	SMK Khir Johari	5	1	3	9
22	SMK Pandan Indah	3	2	-	5
23	SMK Pandan Jaya	-	-	4	4
24	SMK Pandan Mewah	-	-	1	1
25	SMK Sujana Impian	-	1	-	1
26	SMK Sultan Abdul Aziz Shah	3	-	2	5
27	SMK Taman Jasmin 2	-	-	1	1
28	SMK Taman Kosas	10	6	-	16
29	SMK Taman Perimbun	-	-	1	1
30	SMK Taman Seraya	2	-	-	2
31	SMK Taman Tasik	9	9	10	28
32	SMK Tasek Permai	-	-	-	0
33	SMK Tinggi Kajang	-	1	1	2
	Total	67	69	93	229

is chosen as the location of the case study because of the number bullying occur suddenly increase in the year 2015 from one case to 10 cases and keep on the increase in the year 2016. SMK Taman Tasik is chosen as the location of the case study due to the bullying cases that are maintained in the same range between 9 to 10 each year. SMK Cheras Perdana and SMK Jalan Empat are chosen as the comparison for the school in term of lowest bullying occurs. The population of this study consists of four secondary schools in Selangor state which are SMK Cheras Perdana, SMK Taman Tasik and SMK Bandar Rinching and SMK Jalan Empat. The studied school has a mixture genders and ethnic.

Towards achieving the objective, 406 respondents were randomly selected from four secondary schools in Hulu Langat Selangor and 32 blocks of the school building. The respondents involved in this pilot survey were students from the lower form. The survey was done for a period of five days, beginning at 7.20 am until 6.45 pm as the school involve two sessions. The morning session of the school involved Form Three, Form Four and Form Five. Meanwhile, the evening session of the school involved Form One and Form Two. However, the respondent is from Form 1, Form 2 and Form 3. One class from each form was randomly chosen in each school and the questionnaire randomly distributed to the respondent in the class involved. Duration of 10 - 15 minutes was required for each respondent to fill the respected questionnaire forms. The measurement design of the sense of safety in school components was based on the review of previous literature that is relevant to the sense of safety in school components.

In order to examine the effect of physical environment on school bullying, the variable will be measure based on CPTED element which was territoriality, surveillance, and maintenance. School level territoriality is operationalized with two different measures which are symbolization element and ownership element. The element is measured based on the number of the element. The indicators of the ownership are sculptures, school field, garden furniture and mural. School level surveillance is measured based on the observation of a building on how it will give the opportunity to student bullying another student. The item is asked about the hidden corner, the visibility of the building from another, the provision of lamps, the visibility of school activity area and the design of the building. The scale were coded 1 = very unsatisfied which refers to the ability of vision between 0 - 20 percent, 2 = dissatisfied which refers to the ability of vision between 21 - 40 percent, 3 = neither satisfied nor dissatisfied which refers to the ability of vision between 41 - 60 percent, 4 = satisfied which refers to the ability of vision between 61 - 80 percent and 5 = very satisfied which refers between 80 - 100 percent. Meanwhile, school level maintenance is measured by observation of 7 elements of school disorder. The school disorder is including, the presence of graffiti, litter, broken window, and broken doors. The response of the item is the same as the surveillance scale. The scale had been adapted from Sakip, et al. (2012) study on CPTED and fear of crime.

The dependent variables for this analysis were based on the probability of a student being bullied which involving the frequency of a student been bullied for

the past six months. The questions were based on three types of bullying which were; physical bullying (PV), verbal bullying (VB) and relational bullying (RB). In this section contain 15 items that divided into three sub-scale which are physical bullying, verbal bullying and antisocial bullying. The response was range from 1 = never, 2 = once a month, 3 = 2 to 3 times a month, 4 = once a week and 5 = 2 to 3 times a week. The questions were asked in Bahasa Melayu which is reliable with the school type.

4. Data Analysis

Reliability test was performed using Cronbach's alpha for determining the reliability of the items tested (Coakes, Steed, & Dzidic; 2006; Piaw, 2006). There are 15 items under bullying behaviour which are 5 items under physical bullying, verbal bullying and relational bullying. Meanwhile, there are 10 items under surveillance element and 7 items under maintenance elements. Three items which were two from physical bullying and one from surveillance variables were rejected due to a lower score in corrected item-total correlation. The items with a value of Cronbach's α greater than 0.7 were selected because of acceptable reliability values (Nunnally, 1978; Mackenzie, Podsakoff and Podsakoff, 2011). Reliability tests performed as shown in Table 6 obtained the value of $\alpha > 0.70$.

Thus, 31 items from questionnaire and observation form were accepted in the analysis and can be used in the analysis.

Demographics data such as school name, gender, form and race were obtained from the respondents. Table 7 shows the demographic data of the study. The sample of the study consisted of four secondary schools with 81 (20%) respondent from Sekolah Menengah Kebangsaan Jalan Empat (SMKJE), 96 (23.6%) respondents from Sekolah Menengah Kebangsaan Cheras Perdana (SMKCP), 119 (29.3%) respondent from Sekolah Menengah Kebangsaan Taman Tasik (SMKTT) and 110 (27.1%) respondents from Sekolah Menengah Kebangsaan Bandar Rinching (SMKBR). The gender analysis showed that the study consist of 180 (44.3%) male students and 226 (55.7%) female students. Analysis from the respondent showed that 113 (27.8%) respondent from Form One students, 105 (25.9%) respondents from Form Two students and 188 (46.3%) respondents from Form Three students. This study also showed that the respondents came from three different races, where the majority of them were Malays with a number of 303 (74.6%) respondents, 56 (13.8%) respondent were Chinese and 43 (10.6%) respondents were Indian. While the other 1% respondent were from other races such as Sikh, Orang Asli and Iban.

Dependent Variable
Bullying Behavior

The statistical analyses by ANOVA and Tukey's multiple comparison tests were carried out for the four different school on the three types of bullying behaviour. Treatment effects were considered significant at $P < 0.05$ (Snedecor and Cochran, 1967). An analysis of variance in Table 8 showed that the effect of dif-

Table 6. Reliability Test of Variables.

Dependent Variables	Items	Description of Items	Corrected item-total correlation	Reliability (Cronbach's Alpha)
Physical Bullying	Item 1	How often other students hitting you in school?	0.57	
	Item 2	How often other students kick you in school?	0.71	
	Item 3	How often other students pushing you in school?	0.61	0.73
	Item 4	How often other students take or breaking your belonging in school?	-	
	Item 5	How often other students making rude hand gesture to you in school?	-	
Verbal Bullying	Item 1	How often other student making fun and teasing you in a hurtful way in school?	0.60	
	Item 2	How often other students calling you mean names in school?	0.62	
	Item 3	How often other students calling mean names about your race and skin in school?	0.68	0.71
	Item 4	How often other students calling mean names about your race and skin in school?	0.73	
	Item 5	How often other students taunting you in school?	0.63	
Relational Bullying	Item 1	How often other students leave you out on purpose in school?	0.75	
	Item 2	How often other students telling other not to be friends with you in school?	0.75	
	Item 3	How often other students spreading rumours about you in school?	0.72	0.78
	Item 4	How often other students embarrassing you in school?	0.71	
	Item 5	How often other students criticizing you for making you feel bad in school?	0.75	
Surveillance		Observation of school block		
	Item 1	Based on the design of building blocks, the percentage rate allows for the occurrence of bullying	0.70	
	Item 2	Based on the planted element of the plant, the percentage rate allows for visual opportunities towards the school area	-	
	Item 3	Ability or chance of bullies to bully in hidden corners	0.70	
	Item 4	Provision of fluorescent lamps either on the bend	0.68	
	Item 5	Provision of fluorescent lamps on stairs	0.75	0.72
	Item 6	The visual rate of the classroom position can be seen from the direction of the building block	0.63	
	Item 7	The visibility of the building blocks can be seen from the teacher's room	0.67	
	Item 8	The visibility of the open spaces with building blocks	0.69	
	Item 9	Preparation of CCTV in hidden path/stairs/corners	0.72	
	Item 10	The visibility of the activity placement can be seen from the building blocks	0.65	
Maintenance	Item 1	Planting elements in the building block area whether vegetation cover, shrubs, turf grass and trees are well maintained	0.82	
	Item 2	Toilets in the building block are in good condition without graffiti, garbage, damage, and paint on the walls in good condition	0.81	
	Item 3	Paint condition in building blocks in good condition without graffiti	0.74	
	Item 4	The room door at school is in good shape	0.77	0.80
	Item 5	All windows in school are in good condition	0.77	
	Item 6	The lane paths of the school are in good condition without graffiti, garbage, damage, and paint on the walls in good condition	0.72	
	Item 7	Garbage is well maintained in building blocks	0.73	

Table 7. Demographic Distribution.

Criteria		Total No. ($n = 406$)	Percentage (%)
School	Sekolah Menengah Kebangsaan Jalan Empat (SMKJE)	81	20.0
	Sekolah Menengah Kebangsaan Cheras Perdana (SMKCP)	96	23.6
	Sekolah Menengah Kebangsaan Taman Tasik (SMKTT)	119	29.3
	Sekolah Menengah Kebangsaan Bandar Rinching (SMKBR)	110	27.1
Gender	Male	180	44.3
	Female	226	55.7
Form	Form 1	113	27.8
	Form 2	105	25.9
	Form 3	188	46.3
Race	Malay	303	74.60
	Chinese	56	13.80
	Indian	43	10.60
	Others	4	1.0

Table 8. Bullying behaviour in four different school.

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Relational Bullying	Between Gorups	101.291	3	33.764	3.035	0.29
	Within Groups	4371.339	393	11.123		
	Total	4472.630	396			

ferent school environment on relational bullying was significant ($F(3, 393) = 3.035$, $p = 0.029$). The schools that had significantly differences in verbal bullying are SMKJE and SMKTT. The different bullying behaviour in physical bullying and relational bullying may be due to a different environment that exists in each school. Improper landscaping and building design may give the opportunity to the student to bullying other. Differently, with verbal bullying, it can be done quietly and covertly where the children are able to avoid detection and punishment (Atlas & Pepler, 1998). Despite reaching statistical significance, the actual difference in mean score between the groups was quite small. The effect size, calculated using eta squared as below, was 0.02.

$$\text{Eta squared} = \frac{101.291}{4472.630} = 0.02$$

Independent Variable
Territoriality

A total of 32 blocks in four schools were observed to indicate the element of territoriality that exists in each school. Table 9 showed result from the observation indicated that there were 7 blocks in SMKJE with a total of 273 territoriality

Table 9. Territoriality element per block in four schools.

School	Total Block	Territoriality Element		Total	Territoriality element per block
		Signage	Ownership		
SMKJE	7	38	235	273	39
SMKCP	9	14	181	195	21.67
SMKTT	10	23	97	120	12
SMKBR	6	14	174	188	31.33
Total	32	89	687	776	

Table 10. One-way ANOVA Tests between four different schools with surveillance principle.

	ANOVA				
	Sum of Squares	df	Mean Square	F	Sig.
Between Gorups	81.808	3	27.269	1.157	.348
Within Groups	542.192	23	23.574		
Total	624.000	26			

Table 11. One-way ANOVA Tests between four different schools with maintenance principle.

	ANOVA				
	Sum of Squares	df	Mean Square	F	Sig.
Between Gorups	166.684	3	55.561	11.270	0.000[a]
Within Groups	113.390	23	4.930		
Total	280.074	26			

a = means are significantly different at $p < 0.05$.

element, 9 blocks in SMKCP with 195 elements, 10 blocks in SMKTT with 120 elements and 6 blocks in SMKBR with 188 elements. Calculation of territoriality element per block resulting 39 elements per block in SMKJE, 21.67 elements per block in SMKCP, 12 elements per block in SMKTT and 31.33 elements per block in SMKBR.

Based on the observation of territoriality element in four schools, SMKJE and SMKBR had more sense of school ownership in giving of student good school environment compare with SMKCP and SMKTT. This was shown by the numbers of territoriality element per block in the school.

Surveillance & Maintenance

Analysis by ANOVA and Tukey's multiple comparison tests were carried out for the four different schools once again. The objectives of this analysis are to know whether it is different in surveillance and maintenance in four different schools. An analysis of variance in Table 10 showed that the effect of different school environment on surveillance was statistically not significant (F (3, 28) = 0.637, p = 0.598).

But, Table 11 shows that there was significantly different in school maintenance in three different schools (F (3, 28) = 11.683 p = 0.00). The schools that had

different maintenance are SMKJE, SMKCP and SMKTT.

Based on the four analysis that had been done, SMKJE and SMKTT mostly had significant differences in overall school environment based on three CPTED principle. Territoriality principle is closely related to maintenance principle in presence sense of ownership in school. A significant difference was showed in relational bullying in which occur when the students were socializing among the others. Thus, this study showed that there is a possibility the actual physical environment in which students spend the greater part of their day can affect behaviour, which in turn, can lead to school violence.

5. Discussion

The purpose of this paper was to determine if there is a possibility the actual physical environment in which students spend the greater part of their day can affect behaviour, which in turn, can lead to school violence. Table 6 showed the analysis of bullying behaviour in four secondary schools. There are significantly different in relational bullying in SMKJE and SMKTT. The studied schools consist of multi-ethnic and Multilanguage environments, which there is a possibility that particular ethnic or linguistic group likely to be victims. The physical environment in school is believed to be related to developing students behaviour in school (Durán-Narucki, 2008; Liebermann & Kruger, 2004). This finding suggests that different school environment could influence students' interaction and relation with each other. The finding similar with Mohamad Salleh and Zainal (2014) and Rigby (2008) that showed the indirect bullying was the most widely performed compared with direct bullying. Relational bullying is a group process that difficult to see in adults. The schools that had significantly differences in relational bullying are SMKJE and SMKTT.

Figure 1 and Figure 2 showed school maps of SMKJE and SMKTT. From the observation of the maps, there is different in school building arrangement which had possibility leads to different interaction between the students during the recess time. The arrangement of SMKTT building that scattered makes it difficult for adults to monitor compared with the arrangement of SMKJE building which is more organized and compact. The role of building design and layout can affect the behavior of crime (Poyner, 1983; Wilcox, Augustine, & Clayton, 2006).

Apart from that, the physical environment which forms different school environment may influence the bullying behaviour in school. Tables 9-11 show the findings on physical features in four secondary schools based on three CPTED elements. Based on the finding on territoriality element in Table 9, the result indicated that significantly different in element per block between SMKJE and SMKTT. SMKJE had more physical features with seven blocks of school building compared with SMKTT which had ten blocks of school building but less element per block.

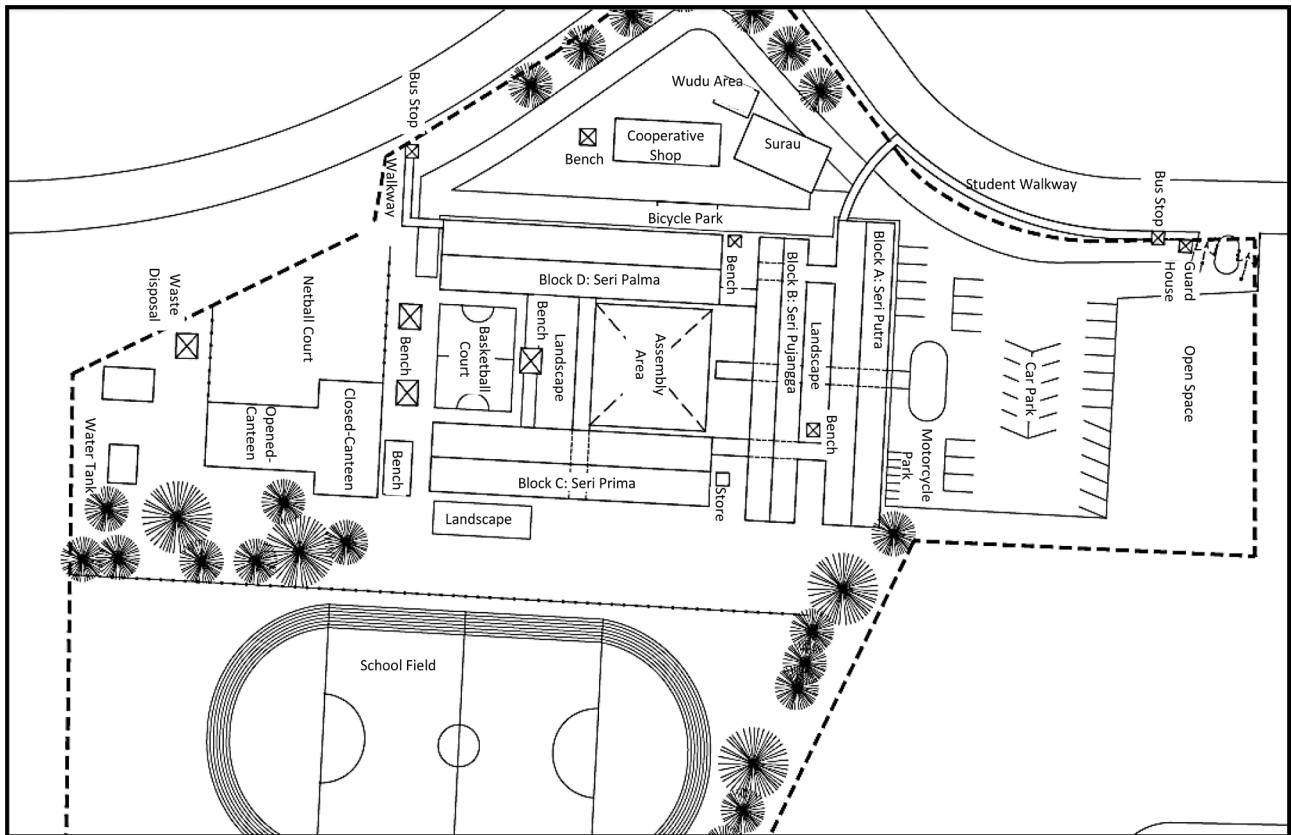Figure 3 and Figure 4 showed territorial element features like signage and
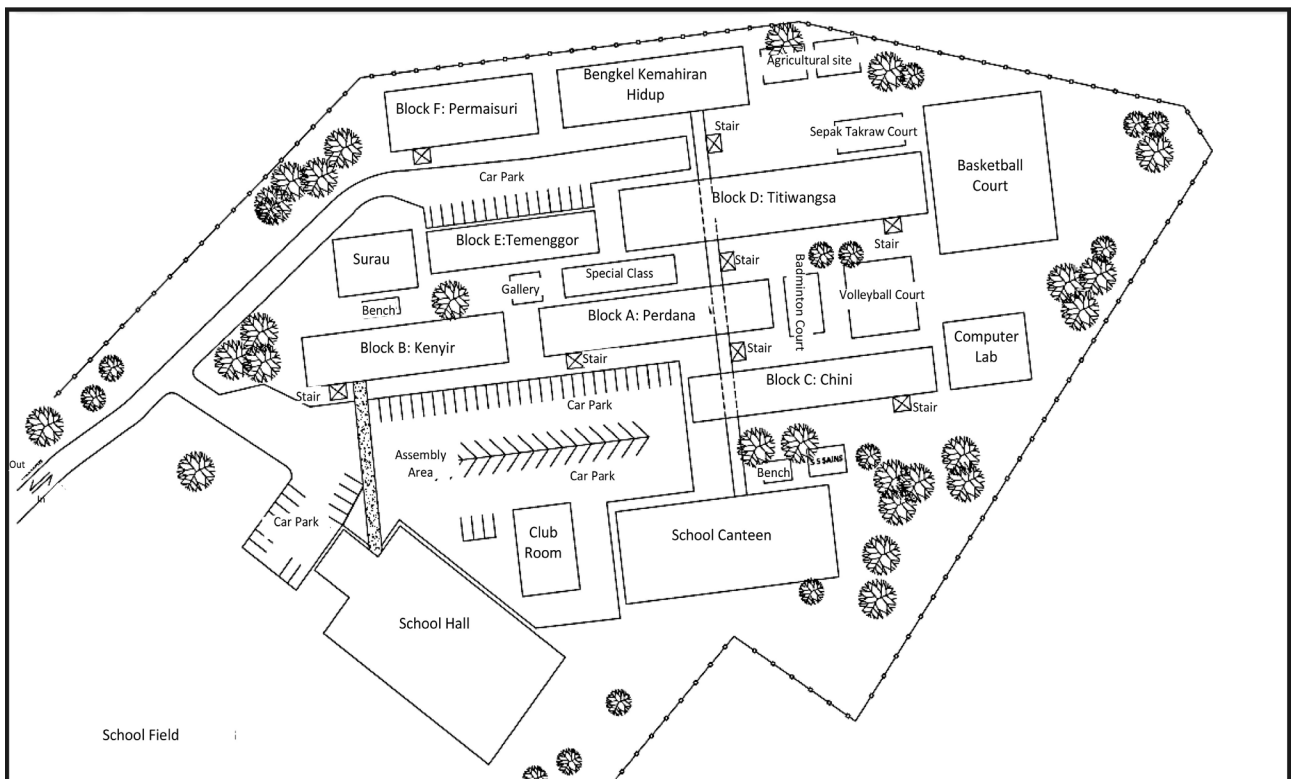
Figure 1. SMKJE school map.

Figure 2. SMKTT school map.

Figure 3. The features of territoriality element in SMKJE.

Figure 4. The features of territoriality element in SMKTT.

sculptures. From the observation in the schools, SMKJE set more resting place for a student to socialize with each other compared with SMKTT. A good conducive landscaped is believed to directly or indirectly assists in providing space for leisure and interacting with landscape components (Ali, Rostam, & Awang, 2015). This paper may have proven that the level of certain components of landscapes at the school in the region is significant can create a sense of ownership by setting up gazebo, pergola, bench, garden tables, signboards and flower pots. Schools that include permanent student artwork in the interior spaces of school buildings also will foster student ownership (Killeen, Evans, & Danko, 2003). This can be proved by the mean (μ) value of relational bullying in SMKTT is higher ($\mu = 1.52$) than in SMKJE ($\mu = 1.32$).

However, even though the school layout and design were different in each school, but the in monitoring each building can be done. This finding was showed in Table 10 which indicated that there was no significant difference in the surveillance element. The visibility of the activity placemen, open space and classroom can be seen from the buildings block. The chances of bullies to bully in the hidden corner are less. Although most of the exterior spaces of the schools are a high-visibility area, there were few respondents respond that the hottest spots were behind the buildings area. This finding tends to support previous studies which indicated that there was low visibility behind the school building (Lee & Ha, 2015).

Meanwhile, Table 11 showed significant differences in maintenance element in SMKCP, SMKJE and SMKTT. This finding would like to focus on the maintenance in SMKJE and SMKTT as the finding before in bullying behaviour indi-

Figure 5. Comparison between bench maintenance in SMKJE and SMKTT.

Figure 6. Comparison between stair maintenance in SMKJE and SMKTT.

cated that significantly different in those schools. The result on maintenance level in SMKJE showed that the level was 61% to 80%. Meanwhile, the level of maintenance in SMKTT was 41% to 60%.

Figure 5 and Figure 6 were a comparison between the bench and stairs between both schools. Paint condition in SMKTT stairs was not in good condition with graffiti compare with SMKJE. The bench for the student to sit also not in good condition in SMKTT with bird dropping on it. Even though the element of plants were also had at SMKJE bench, but the bench was in good condition. Lacks maintenance in SMKTT may develop bullying behaviour similarly with the previous study by (Lorenc, et al., 2013; Wilcox, et al., 2006). Dirt, decay, graffiti, litter and other sign of the environment are referred as "sign of crime", and people tend to fear with this environment. These findings tend to support previous studies on physical environment and student misconduct by Wilcox, et al. (2006).

5. Conclusion

As a whole, there is a possibility the actual physical environment in which students spend the greater of their day can affect bullying behaviour in secondary school. The physical environment surrounding the child has a great influence on his or her development. Well-designed schools can positively affect learning by focusing on issues such as location, building materials, size of classrooms, furniture, lighting, temperature, ventilation and noise level. Bullying in school may be an earlier stage on developmental sequence leading to a strong predictor of de-

linquency and future crime. The ecological theory suggested that physical characteristic can affect the crime (Shaw & McKay, 1942). A well-structured school physical environment helps to promote learning and encourage positive social interactions among students. Poor designs such as dim lighting, poor lines of sight and narrow corridors are cited by young people as being to blame for the sense of fear and risk associated with these out of the way places. The physical condition and on-going maintenance of the school building are an important factor in setting a positive school tone. A clean, well-maintained building is fundamental to the creation of an optimal environment for teaching and learning. Lack of monitoring has made these out of the way locations prime spots for vandalism and graffiti and contributing to the feeling of being unsafe. The school community has to focus on developing a good environment in school. Achieving good design and environment is about creating places, buildings, or spaces that work well for everyone, look good, last well, and will adapt to the needs of future generations. Further analysis of regression analysis can be tested between the type of environment in school and the incident of bullying when the other factors such as social status, gender, ethnic and language are controlled.

Limitation

The study only focuses on secondary school and not involved boarding school and technical school because of similarity spaces that majority of all schools had. Compared with the boarding school, the secondary students tend to have smaller spaces. Boarding school had more spaces to monitor as it involved hostel for students. There are limitations on the school design in obtaining a comprehensive picture of factors associated with bullying victimisation due to the different design and arrangement of school.

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