

Lisbon – Malacca Port Cities Twin Conferences 2019 / 2020



## AicQoL2020Malacca

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**8th AMER International Conference on Quality of Life**

Mahkota Hotel Melaka, Malacca, Malaysia, 18-19 Mar 2020

(Due to the Covid-19 lockdown, paper virtually presented on 25 Mar 2020)



# Attributes of Urban Green Infrastructure (UGI) and its Use by Young Adults in Kuala Lumpur City

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## Abstract

Attachment to indoor activities has implications for young people in a city, such as sedentary behaviour. It may be the cause of the rise of non-communicable diseases (NCDs). Nature in a city, i.e. Urban Green Infrastructure (UGI) is vital to overcome these issues. It acts as a reinforcement to promote healthy lifestyles. The study explores young people's use and favourable attributes that attract them to UGI. A survey of young people (n=1397) was conducted in Kuala Lumpur and Putrajaya. Safety, nature, cleanliness and design aspects are the attributes that UGI needs to reduce the sedentary indoor lifestyle of young people.

**Keywords:** Urban green infrastructure (UGI); Recreation; Leisure; Healthy lifestyle

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DOI: <https://doi.org/10.21834/e-bpj.v5i13.2071>

## 1.0 Introduction

Green infrastructure network in this paper refers to a wide range of green amenities associated with recreational space such as large recreational parks in Kuala Lumpur city, district and neighbourhood parks, playfield, civic open spaces, small green areas or called pocket spaces and garden, sidewalk, pedestrian paths and natural recreational areas. It is open to everyone and is a network that connects green areas with other building infrastructures for a community. The green network is an effort to overcome the negative impact of the urban built environment. It acts as climate moderation of extreme built intervention and rapid development of the urban environment. The service provided to urban inhabitants is invaluable, whereby it allows people to do recreation, play, relax, relieve stress and socialising with others. In Malaysia, any urban development involving various land uses, such as residential, commercial, industrial, institutional and mixed development requires at least 10% of urban green infrastructure (UGI) in the form of various recreational areas (JPBD, 1997; 2006).

This paper presents an exploration of the ways that young people's use of UGI in Kuala Lumpur city and the attributes of UGI that are favourable as factors that attract them to the UGI. This is because it is suggested that sedentary behaviour among young people are prevalent in Malaysia. According to the Malaysian Youth Index 2015, sedentary behaviour among youth was higher (93.29%) than doing physical activity (68.74%). As a result, an increasing number of young people were found to be overweight or even obese. National

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Health and Morbidity Survey (NHMS II) conducted in 2011 reported that 30% of the population who are Malaysians, aged 18 years and older are overweight (Teh et al., 2014). The Ministry of Health Malaysia (2010) points the cause of low physical activity or not exercising at all. Lower participation in active activity among adolescent and youth leads to unhealthy lifestyles and physical health. Several studies indicate that the low level of leisure activities is due to modern technologies (Mohamad Idham et al., 2014; Thomée et al., 2015), social influences (Wight et al., 2009), lack of time, lack of access and safety issues in public space (Kaczynski et al., 2008; McCormack et al., 2010; Ries et al., 2011). The electronic entertainments being part of urban life nowadays divert them from enjoying outdoor activities. The decline in leisure activities and practising sedentary behaviour may be the cause of the rise of non-communicable diseases (NCDs) among adolescents and young people. It also increases the issues of overweight and obesity among teenagers (Gonçalves et al., 2012). Nature in a city, which is formed by recreational parks and smaller green spaces are the urban green infrastructure (UGI) vital to overcoming the sedentary lifestyle. They act as reinforcement to promote a healthy lifestyle for wellbeing. UGI as nature is proven to offer various health benefits physically, mentally and socially. The recreational park is one of the favourite public spaces among Malaysians to spend leisure activities where they can get access without any entrance fee (Danis et al., 2014). However, many do not appreciate and use these facilities properly and wisely. Sadly, young people are among the user group that are claimed to be involved in unhealthy activities such as loitering culture, illegal racing, vandalism, and graffiti (Sharifudin, 2015). The attributes of UGI that can attract users to participate in outdoor recreation are important. Studies have highlighted that low level of physical activity and youths' presence in the recreational park was due to unfavourable conditions of UGI that failed to match and fulfil their needs in terms of features and facilities, safety, accessibility and other (Abd Latif et al., 2011; Rosilawati Zainol, 2011). The provision of UGI for recreation and play spaces in the UGI is needed. Khairuddin et al. (2015) stated that appropriate facilities and play spaces for young people, especially adolescent may reduce unhealthy activities and social problems.

## 2.0 Urban Green Infrastructure

The Green Infrastructure network is a relatively new term. The use of the term exists in the 1990s and is increasingly widely used today. The concept of green infrastructure was used in the United States, which explains the importance of nature and its components as an ecosystem service to handle issues of land use planning. Studies on UGI that relates to the well-being of the ecosystem and people are increasingly relevant in many fields of human behaviour studies and as biodiversity conservation. Similar terms for UGI are such as the green network, green connector, green system, biotope network, green corridor and ecological hub, ecological network and habitat network. However, even though it is a relatively new term, the concept has already been used for so long. In landscape architectural study, its importance has begun as early as the 19th century. For example, in the 19th century, Frederick Law Olmstead, the founder of the Landscape Architecture has suggested that nature in a city can solve urban problems such as pollution and reduce the stress of its inhabitants. He was aware of the role that UGI can improve the quality of life of the community and strive to utilize this knowledge to his park and garden design in major cities in the United States.

The UGI has no fixed universal definition. It is often adapted according to the context of study whether it is a study on conservation of species, habitat rehabilitation, area growth, community development, climate adaptation or cityscape features that need to be protected and improved. In general, UGI is defined as the natural, semi-natural environment of land, water, coastal and marine areas as well as green areas in the rural areas. UGI emphasizes on the importance of biodiversity conservation by connecting the ecological network and contributing to the conservation of landscape in various scales. In the context of a city, UGI is associated with recreational spaces such as a city park, a district park, a neighbourhood park, sports field, civic open spaces, pocket green spaces, and its networks (e.g. tree-line pedestrian streets and vehicular scenic streetscape with trees). The green infrastructure in Malaysia is a term known as land/space for *leisure and recreation* (JPBD, 1997, 2005). It is a formal term in the context of urban planning as defined by the Department of Town and Country Planning, Peninsular Malaysia (JPBD, 1997) in the Town and Country Planning Act (Revised) 1995, Act (A933) Section 2 (f).

## 3.0 Young People and Leisure Activities

In 1997, The National Youth Development Policy of Malaysia has defined young people as youth aged between 15 and 40 years. Nonetheless, the current administration of the Youth Ministry and Sports Malaysia has proposed the age limit to define youth is between 30 and 35 (Jeevendran, 2018). For paper, young people are defined as adolescent and youth between the age of 15 to 40. It takes a definition of young people from The National Youth Development Policy of Malaysia (1997) and definition of adolescent and youth from the World Health Organization (WHO) and the United Nations (UN).

Growing researches have been looking into the type of activities that young people engaged in Malaysia (e.g. studies by Institute for Youth Research Malaysia; Ramli et al., 2017; Abd Latif et al., 2011). Reviews of literature summarised in Table 1 suggest that the areas of study related to young people can fit into studies about their lifestyle, health issues, activity pattern, activity in UGI, needs, preference and attributes favourable in UGI. This paper presents findings that relate young people with types of leisure activities and the use of UGI in the city of Kuala Lumpur. It adds to the pool of literature concerning young people's lifestyle in a city.

Table 1. Studies on young people and activity pattern

Authors	Topics of Studies	Concerns of study
Videnović et al. (2010)	Young People's Leisure Time: Gender Differences	Young people & lifestyle
Rahim et al. (2011)	Leisure Time among the Youth	
Wight et al. (2009)		

Qidwai et al. (2010)	Physical, social and temporal contexts of physical activity among urban adolescents	
Agosto et al. (2005)	Teenage Leisure Time in Socially Deprived Areas Lifestyle and Behaviour of adolescents from a developing country	
Teo et al., (2014)	Everyday life information-seeking (ELIS) behaviours of urban young adults Lifestyle Practices and Obesity in Malaysian Adolescents	Young people, lifestyle & health issue
Zulkia et al., (2014)	Youth's Recreational Behaviour and its effects on Body Mass Index (BMI)	
Salimin et al., (2015)	The Effectiveness of Physical Activity among Obese Students	
Rosilawati Zainol et al. (2011)	Identifying Youth Recreational Area	Young people, recreation & park recreation
Ries et al., (2011)	The Neighbourhood Recreational Environment and Physical Activity Among Urban Youth	
Drygas et al., (2008)	Physical activity of youth in non-urban parks Recreational and leisure time physical activity of teenagers	
Duzenli et al. (2010)	Needs and preferences of adolescents in open urban spaces; Youth Preference of Extreme Parks Design in Urban Areas	Young people, park recreation, preference of attributes
Latifyan and Salavati (2015)		
Khairuddin et al. (2015)	Sport and Physical Activity Participation, Motivations and barriers	
Chiu, L. K. et al. (2016)	Park Characteristics Related to Park Use and Physical Activity Among Urban Youth	

## 4.0 Methodology

### 4.1 Data collection

The study uses a purposive sampling method to obtain the units of analysis for this study. A self-administered questionnaire survey was conducted in recreational parks, public spaces and residential areas in Kuala Lumpur. The questionnaire was prepared in Bahasa Melayu and English. 1650 survey questionnaires were printed and distributed among residents and users of UGI living in various zones in Kuala Lumpur. Two ways were carried out to obtain responses for the survey: (a) intercepting passer-by in recreational parks and public spaces, and (b) door-to-door survey in residential areas where researchers distributed the survey forms, give respondents a completion deadline and collect the survey form at the deadline. 1397 questionnaire forms were obtained, which calculated a good rate of return of 84.7%.

The questions were divided into four sections which are: Respondents background, Leisure time activities, Activities in UGI and UGI Attributes. Section A: Respondents background identifies the gender, age group, place of residence, and educational background of the young people. Section B: Leisure Time Activities explored activity patterns of young people's leisure time during weekends and weekdays, excluding the time that they spend for school session, homework, working and others. This is to identify activity patterns during leisure time for both indoor and outdoor activities. In this section, respondents were given the choice of answers from (1) very seldom, (2) seldom, (3) sometimes (4) often and (5) very often, which were combined to become a 3-scale format of answer: seldom, sometimes and often. Section C: Activities in UGI focused on the frequency of use of UGI including the city park, neighbourhood park, pocket spaces, café, sidewalk, natural forest and sports complex. Likert-scale format on respondent's agreement and ranking scale of 10 was given. In Section D: UGI Attributes, respondents were given an agreement scale on attributes that are favourable in the UGI.

### 4.2 Analysis

The findings from the self-administered questionnaire survey were analysed using computer software, which is the Statistical Package for Social Science (SPSS). The findings are presented in the forms of table, bar charts, cross-tabulation analysis and mean score ranking. Most of the analysed data collected from the questionnaire survey were summarise statistically using descriptive statistic.

## 5.0 Results and Discussion

### 5.1 Respondents' background information

The total number of young respondents participated in the study are 1397 (n). Table 2 shows that the respondents consisted of two age groups: adolescents within the age of 15-21 years old (n=557), and youth within the age 22-40 years old (n=840). The respondents live in nine zones in Kuala Lumpur city and its fringe areas. Six of the zones are within the Kuala Lumpur conurbation. Three areas are the fringe areas of Kuala Lumpur, which are in the Selangor state and Putrajaya. The respondents from fringe areas are indicated as South-South West and South-South East, such as Putrajaya, Cyberjaya, Puchong, Bangi, Kajang, Seri Kembangan and Serdang. The North-North West respondents live in the areas of Petaling Jaya, Shah Alam, Rawang and Bukit Beruntung. Most respondents who participated in the survey live in Wangsa Maju-Maluri zone (n=663). The smaller sample population lives within the fringe areas of Kuala Lumpur, i.e. in Putrajaya and Selangor and the city centre.

Table 2. Background of respondents

Item	Measure	Frequency	Percent
Age group of young people	15-21 yrs old	557	39.9%
	22-40 yrs old	840	60.1%
Gender	Male	397	28.4%
	Female	1000	71.6%
Education level	PhD/Master	79	5.7%
	Degree/diploma/certificate	1011	72.5%
	Secondary education	299	21.4%
	Primary education	4	0.3%
	No formal education	2	0.1%
Zone of residency	Kuala Lumpur City Centre	40	2.9%
	Wangsa Maju-Maluri	663	47.6%
	Sentul-Manjalara	272	19.5%
	Damansara-Penchala	138	9.9%
	Bukit Jalil-Seputeh	41	2.9%
	Bandar Tun Razak-Sg. Besi	124	8.9%
	North-NW KI	46	3.3%
	South-SW KL	41	2.9%
	South-SE KL	28	2.0%

### 5.2 Types of leisure activities

Figure 1 shows the responses to types of leisure activities. The items were randomly asked in the survey questionnaire. The measure of these items used 5-point Likert scale from very seldom (1) to very often (5). ‘Seldom’ means once in 3 months, ‘sometimes’ means once a month and ‘often’ means once or more in a month. To present the result, the measurement scales were re-code into a 3-scale format, which is: 3-often (very often & often); 2(sometimes), and (1) seldom (very seldom & seldom). After thematic analysis, results suggest that three main types of activity: (1) Type 1- indoor sedentary activity, (2) Type 2- activities in UGI, and (3) Type 3- visiting commercial spaces and events. The indoor sedentary activity includes, a) watching TV/video, (b) internet usage and c) relaxing at home. Activity in UGI includes sightseeing in recreational spaces and parks and engaging in sports in public spaces. Type 3 activity involve outings at shopping areas, visiting café, attending events and playing sports in indoor areas. Mean score 3 is the highest (‘often’), and 1 is the lowest mean score (‘seldom’). The mean score of each group of activity found that the highest mean score is spending time on the internet, computer, electronic gadget (mean=2.6662) in Type 1 activity. The lowest is attending events (mean score-1.3520) in Type 3 activity. Type 2 activity consists of sightseeing in recreational parks and green space (mean score--1.6526) and participating in outdoor sports in at UGI such as parks and open space (mean score-1.6738).

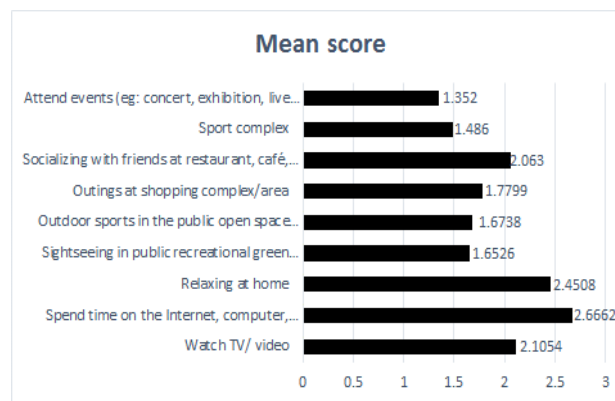


Fig. 1. Three types of activity of young residents

A quick analysis was carried out using cross-tabulation analysis and Chi-square tests found that there is no significant difference in percentage between the two groups of young people (adolescent and youth). Both are seen to have more or less similar percentage results for the three types of indoor sedentary activities. Thus, the results were not shown in this paper.

Literature evidence such as Teo et al. (2014) and the Malaysian Youth Index (2015) suggests that young people’s engagement in sedentary activities was increasing. Then, similarly, this finding suggests that young people like to spend time indoor more than participating in outdoor activities. It seems that young people’s lifestyle is largely shaped by the internet, social media and the technology that do not promote active outdoor activities, particularly in nature. Although scores for indoor activities were higher, there are still some respondents are interested in recreational activities in the UGI, even though the results suggest low-frequency score, such as sightseeing in the public recreational park and playing sports. It means that young people are aware of the benefits of participating in outdoor activities in the UGI.

### 5.3 Activities, types of urban green infrastructure (UGI) and their ranking

This section shows several results concerning activities in UGI and their ranking based on respondents’ preference. Using the similar Likert scale format of as presented in Section 5.2, respondents’ activities in UGI were analysed using cross-tabulation. The types of

activity that happen in the UGI consist of leisure time such as sightseeing and passive recreation. Sports activities consist of playing football, badminton and others in parks and on the field. Results suggest that both activities in the Type 2 category, received 'seldom' response, which means that respondents have rarely visited or use UGI within their reach (Table 3). There is also no significant percentage difference between both groups of young people according to age. The total mean score for sightseeing and sport activity was also low (1.6526 & 1.6738 respectively).

Table 3. Cross-tabulation results on types of indoor activity in urban green infrastructure (UGI)

		Age group		
		15 - 21 years old	22 - 40 years old	Total
UGI * Age group	seldom	320	377	697
Crosstabulation		57.5%	44.9%	49.9%
Sightseeing in public recreational green space	sometimes	161	326	487
Mean=1.6526		28.9%	38.9%	34.9%
	often	76	136	212
		13.6%	16.2%	15.2%
Total		557 (100%)	839 (100%)	1396 (100.0%)
SportUGI * Age group	seldom	283	401	684
Crosstabulation		50.8%	47.9%	49.0%
Sports in public open space (eg: football, badminton)	sometimes	169	313	482
Mean=1.6738		30.3%	37.4%	34.6%
	often	105	124	229
		18.9%	14.8%	16.4%
Total		557	838	1395
		100.0%	100.0%	100.0%

Visits to eight types of UGI were asked to the respondents using the measurement scales as shown in Table 4. Likert scale measure of 1 to 4 indicates 1-never, 2-seldom; 3-sometimes; 4=often. Seldom means once in 3 months, sometimes means once a month and often means once or more in a month. Mean score > 3 suggests a positive response, i.e. from scale 'sometimes' to 'often' visit UGI. The results suggest a low mean score for all types of activities in the UGI (mean score= 1.81 – 2.47). The highest, which is 'seldom' scale (once in three months) is the use of sidewalks, children's playground, neighbourhood park and pocket park. It shows that young people seldom or rarely use UGI for leisure activities.

Table 4. Visits to various types of UGI

Scale	1	2	3	4	Mean	Missing system
Measure	never	seldom	Sometimes	often		
C1-g Sidewalk/pedestrian walkway	18.9%	<b>38.8%</b>	18.5%	23.9%	2.47	15
C1-f Children playground	20.4%	<b>45.7%</b>	17.3%	16.6%	2.30	2
C1-d-Neighborhood Park	22.8%	<b>42.5%</b>	18.4%	16.3%	2.28	4
C1e-Green open space	22.1%	<b>44.5%</b>	17.9%	15.5%	2.27	12
C1-h-Mini / pocket park	25.9%	<b>43.1%</b>	16.9%	14.1%	2.19	2
C1-k-Outdoor sport complex	36.6%	<b>43.5%</b>	12.9%	7.0%	1.90	12
C1-c-Civic field	36.6%	<b>49.8%</b>	8.1%	5.4%	1.82	34
C1-l-Natural Forest Recreation Park	40.1%	<b>44.3%</b>	10.4%	5.2%	1.81	6

The most visited significant recreational parks in Kuala Lumpur and Putrajaya were also explored to see the level of use of these UGI. Likert scale measure of 1 to 4, which are: 1-never, 2-seldom; 3-sometimes; 4=often. 'Seldom' means once in 3 months, 'sometimes' means once a month and 'often' means once or more in a month. Mean score > 3 suggests a positive response of visitation to recreational parks as UGI in Kuala Lumpur. However, looking at the mean score result in Figure 2, it suggests that all these recreational parks received a very low mean score, i.e. mostly seldom.

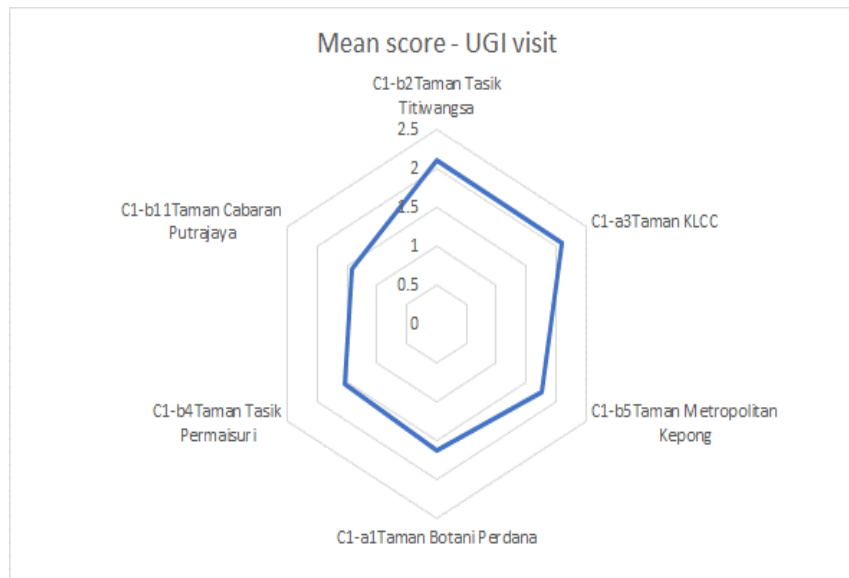


Figure 2. Mean score of a visit to types of UGI  
1-never, 2-seldom; 3-sometimes; 4=often.

Table 5 shows the ranking of activities in UGI based on frequencies using scores from 1 to 10; 1 means first choice and 10 means the last choice. The first choice of UGI, according to mean score is a sports complex, and the last choice is the city park.

Table 5. Results indicate the percentage of choice, mean and rank for each UGI

UGI	FREQUENCY (n=1397)										Mean score	Ranking
	1*	2	3	4	5	6	7	8	9	10*		
Sport complex	8.5%	7.1%	5.1%	7.9%	7.6%	5.9%	9.4%	10.6%	13%	24.9%	6.6	1
Civic or play field	4.8%	8.1%	9.1%	9.2%	7.5%	11.1%	10.1%	12.3%	12.2%	15.6%	6.24	2
Pocket space	2.9%	7.3%	8.5%	11.8%	11.7%	13.3%	14.3%	14.9%	11.3%	4.2%	5.90	3
Natural area/forest area	12%	8.3%	7.9%	6.5%	8.7%	10%	9.6%	9.9%	14.7%	12.4%	5.85	4
Sidewalk	7.3%	9.4%	13.3%	10.1%	12%	10.4%	10.2%	9.2%	10.4%	7.7%	5.44	5
District park	6.7%	14.6%	10.4%	12.3%	13.2%	11.9%	11.4%	7.5%	7.9%	4.1%	5.05	6
Green space at residential area	8.2%	15.6%	12%	14.2%	12.5%	10.4%	9.2%	8%	6.3%	3.6%	4.78	7
Neighbourhood park	15%	10.4%	15.1%	12.9%	10.4%	10.3%	8.1%	8.6%	5.8%	3.5%	4.59	8
City/Metropolitan park	25.3%	13.1%	10.7%	8.1%	8.4%	8.4%	6.4%	6.2%	6.1%	7.2%	4.30	9

Note: \*1-1<sup>st</sup> choice; \*10-last choice

Therefore, the finding suggests that smaller UGI such as sports complex, playfield and pocket spaces are more favourable to the respondents for daily/weekly active activities. Among the types of UGI (Table 4 & 5) and recreational parks in Kuala Lumpur (Figure 2), the sidewalk has the highest mean score. It is probably used for leisure, walking and jogging activities as compared to a larger type of UGI. Children’s playground, neighbourhood park and pocket park are also ranked higher as compared to other large UGI, even though the scores on visitation were still low. It means that more provision of small UGI such as a good network of streets and pocket spaces can increase participation outside the home. Large UGI such as city park or neighbourhood parks are less visited because users have to allocate a considerable amount of time to be there due to distance and reachability. Table 5 also shows that active activities in UGI are a favourite outdoor leisure time among young people. Thus, we found that UGI is not the most frequented places by young people. According to the literature, these happen because of various factors such as indoor activities that allow people to engage with the outside world through technology and social media platforms (e.g. studies by Videnović et al., 2010; Rahim et al, 2011). Others are because UGI is not attractive enough for young people to use them frequently.

#### 5.4 Attributes of UGI to attract young people

The results in Figure 3 identify reasons for use or lack of use of the UGI according to the preferable attributes of UGI. Sixteen attributes were asked in the questionnaire. The items were based on the significant attributes for a good recreational green infrastructure based

on reviews of literature. The agreement scale of Likert format was used to measure the respondents' answer. Figure 3 suggests that safety, natural element, cleanliness, comfort, facilities and universal design received the highest scores (mean score 4.40 - 4.47).

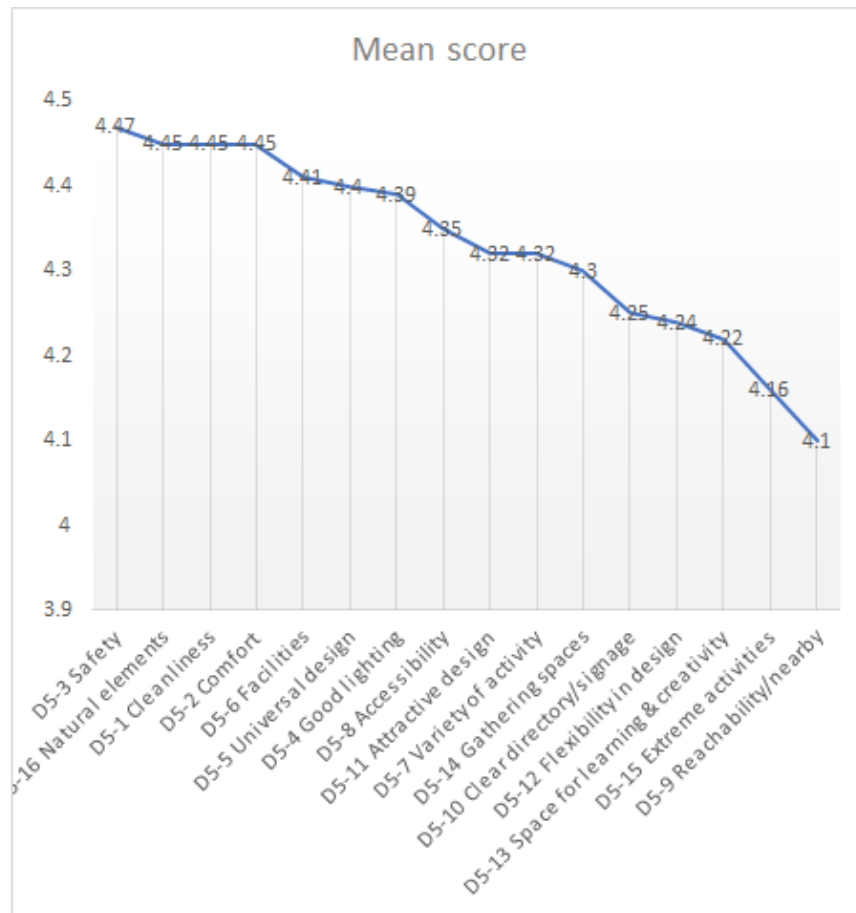


Figure. 3: Attributes of UGI favourable to respondents

The physical attributes of UGI that received the highest scores are about safety, natural element, cleanliness, comfort, facilities and universal design. Safety becomes the main concern not only to young people. Studies by Seaman et al (2010), Ayegi and Ujang (2014) and Maruthaveeran and van den Bosh (2015) have also pointed out similar findings such as people are not interested, uncomfortable or even afraid to spend time in recreational parks if there exist unhealthy activities and poor treatment to facilities (vandalism, graffiti) among park users. The feeling can happen if the UGI is lacking in surveillance, enforcement and maintenance. For example, secluded and dirty areas can become a drug addicts' spot; inappropriate design features and poor planting arrangements encourage indecent acts, theft and other crimes. As a result, safety in UGI ensures young people to enjoy spending time and frequenting many UGI in a city.

## 6.0 Conclusion

Contact with nature in a city in the form of UGI is crucial for young people. It is needed for physical health, and emotional and stress relief, as evident in literature. The presence of natural attributes in UGI such as water element, the greenery that offers beautiful scenery and cooling effects of the micro-climate, and the sound of birds chirping create a sense of tranquillity and well-being of using the UGI. In other words, natural attributes can benefit the physical and emotional well-being of people. However, the findings of the paper show that the time spent in the UGI is lacking for young people. The engagement in sedentary activities at home is increasing. This is evident from the findings that suggest watching TV/video, internet usage and relaxing at home are the highest activities as compared with activities in the UGI or even attending social gathering outside home. The use of recreational parks in Kuala Lumpur such as Titiwangsa Lake Garden is minimal. The conditions are partly due to unattractive design features and activities offered in recreational parks and other significant UGI. Hence, appropriate recreational facilities provided in UGI and legible design layout are crucial elements to attract and enable users to do activities in groups, with friends and family. For example, programmes in the UGI that offers young people to join fitness programmes, do gathering and do active activities are the design features and opportunities that need to be considered by the city council and related parties involved in improving the external built environment of a city. UGI that provide various spaces for activity can attract young people because they offer many choices of places and interesting activities that are suitable for them. It is also recommended that the UGI to be easily accessible by various mode of transportation within a short time. The successful implementation

of UGI will encourage young people to be outside, have better communication among park users and strengthens the relationship between one another. Providing a variety of activities may also reduce unhealthy activities and social problems in UGI meant for recreational activities. The idea for the future development of UGI for young people in a city has a certain significance in the time when sedentary lifestyle is prevalent. The new solution that links between the health of young people and the improvement of nature in a city needs to be further explored to produce active, healthy and happy human capitals.

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