THE USE OF URBAN GREEN SPACES IN HIGH DENSITY CITIES: AN INVESTIGATION OF SALIENT ATTRIBUTES AND CITIZEN ATTITUDES IN HONG KONG

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The Use of Urban Green Spaces in High Density Cities: An Investigation of Salient Attributes and Citizen Attitudes in Hong Kong

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CERTIFICATE OF ORIGINALITY

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(Signed)

WAN Kar Ho (Name of student)

Abstract

Urban green space (UGS) is an essential element in land use planning. Public authorities have been identifying ways to encourage the use of UGSs primarily because of their contribution to a higher quality of life. Specifically, UGSs provide rejuvenating experiences for stress relief, resources for physical activities, and opportunities for social interactions. Given that land resources are scarce in high-density cities, such as Hong Kong, a sound understanding of the attitudes and preferences of users would help public authorities effectively utilize land resources that, in turn, can meet the needs of citizens and encourage their use of UGSs.

As documented in the literature, three knowledge gaps exist in this research area. First, prior studies focused on how the attributes or characteristics of UGSs may influence people's intention to use them. Considering contextual and cultural differences, there is yet a set of consensual characteristics. Second, previous studies excessively focused on intrinsic park features and socioeconomic variables, failing to consider the complexity of the evaluative and psychological processes of users. Third, inconsistent results have been observed regarding the relationship between UGS characteristics and behaviours of users. This study aims to fill the aforementioned research gaps by identifying the key attributes of UGSs in Hong Kong as well as the factors influencing their use. In light of

increasing urban intensification, the results of this study would be useful for UGS planning in high-density cities and in the global context.

The three main objectives of this study are as follows: (1) to identify the salient UGS attributes in Hong Kong and examine their influence on the behaviours of users, (2) to develop and validate a conceptual model with which to explain the use of UGSs, and (3) to draw policy and design implications for encouraging the use. To achieve the aforementioned objectives, repertory grid technique (RGT), an interview technique used to elicit implicit individual constructs, was first applied to interview UGS users with the goal of identifying the salient attributes of UGS. Subsequently, the attributes identified via RGT and other established measurement items of the attitudes and behaviours of users were used to develop a questionnaire. A telephone survey was conducted to validate the conceptual model and explain the use of UGS. Finally, the results revealed a specific set of salient UGS attributes in Hong Kong, verifying that the use of UGSs is influenced by attitudinal and social factors apart from the characteristics of UGSs.

This research has contributed to the literature and improved the decision-making process of designing and planning UGSs. The main contributions of this research are three-fold. (1) This study identified a set of salient UGS attributes in Hong Kong, which can help policymakers and planners develop a reasoned understanding of the specific needs and preferences of city dwellers in a compact urban milieu. (2) This study added psychological constructs related to UGSs and identified valuable insights into key factors influencing their use. (3) Finally, this

study recommended alternative ways to increase the use of UGSs by focusing not only on their attributes, but also on promotional campaigns to influence people's attitudes and to position the use of UGS as a social trend.

Publications Arising from the Research

Published Journal Papers

1. Wan, C., & Shen, G. Q. (2015). Encouraging use of urban green space: the mediating role of attitude, perceived usefulness and perceived behavioural control. *Habitat International, 50*, 130-139.

2. Wan, C., Shen, G. Q., & Yu, A. (2015). Key determinants of willingness to support policy measures on recycling: a case study in Hong Kong. *Environmental Science & Policy*, *54*, 409-418.

3. Wan, C., & Shen, G. Q. (2015). Salient attributes of urban green spaces in high density cities: the case of Hong Kong. *Habitat International, 49,* 92-99.

4. Wan, C., Shen, G. Q., & Yu, A. (2014). The role of perceived effectiveness of policy measures in predicting recycling behaviour in Hong Kong. *Resources, Conservation and Recycling*, *83*, 141-151.

5. Wan, C., Shen, G. Q., & Yu, A. (2014). The moderating effect of perceived policy effectiveness on recycling intention. *Journal of Environmental Psychology*, *37*, 55-60.

6. Wan, C., & Shen, G. Q. (2013). Perceived policy effectiveness and recycling behaviour: The missing link. *Waste Management*, 33(4), 783-784.

7. Wan, C., Cheung, R., & Shen, G. Q. (2012). Recycling attitude and behaviour in university campus: a case study in Hong Kong. *Facilities*, *30*(13/14), 630-646.

Journal Papers under Review

1. Wan, C., & Shen, G. Q. (2015). The moderating effect of subjective norm on use of urban green space: a study in the high density city of Hong Kong. *Urban Forestry & Urban Greening*. (submitted on 13 May 2015; major revision on 21 July 2015; revision submitted on 6 August 2015).

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Chapter 1 Introduction

1.1 Background

Hong Kong is one of the most densely populated cities in the world, with an average land population density of 6,544 persons per km^2 (Census and Statistics Department, 2011). Over 80% of the total area of Hong Kong is hilly terrain, which is unfavorable for urban development (Lo & Jim, 2012; Ye, 1998). This physical limitation restricts urban areas to approximately 24% of total land (Planning Department, 2013). Therefore, Hong Kong is a compact city and is characterized by mixed land use, population and housing diversity, efficient mass transit system and cheap public transport, as well as easy access to most facilities. Nevertheless, a compact city often experiences land resource scarcity, traffic congestion and environmental deterioration, which pose significant challenges for urban planning (Ganesan & Lau, 2000). Shen et al. (2009) proposed that sustainable land use in the context of Hong Kong "should be able to utilize land allocation/distribution efficiently and effectively to meet the needs of both present and future developments, socially, fulfilling the various requirements…" (p.15). Therefore, in the decision-making process of land use planning, sustainability in meeting economic, social, and environmental needs should be considered.

Hong Kong is a "land-hungry" city that has a high demand for land (Tang, Wong, & Lee, 2007). However, the government acknowledged the importance and positive aspects of urban green spaces (UGSs), such as their contribution to the psychological stress relief and physical well-being of individuals in the community (Planning Department, 2005). In Hong Kong, there are 25 km^2 of land zoned for open space, this accounts for a significant proportion of the developed land area of the city (Planning Department, 2013). Figure 1.1 shows that open spaces account for 2% of the total land and 9% of the urban land area in Hong Kong. According to the Hong Kong Planning Standards and Guidelines, UGSs are generally divided into three tiers, namely, regional, district and local, which range from large to small sites, to address territorial-, district- and neighborhood-level needs, respectively (Planning Department, 2005). Regional sites should be at least 5 hectares to enable the establishment of facilities meant for an extensive range of activities. District sites should be at least 1 hectare to enable the establishment of facilities for core activities and passive recreation. Finally, local sites should be at least 500 m^2 to enable the establishment of facilities for passive activities as well as sitting-out areas and playgrounds.

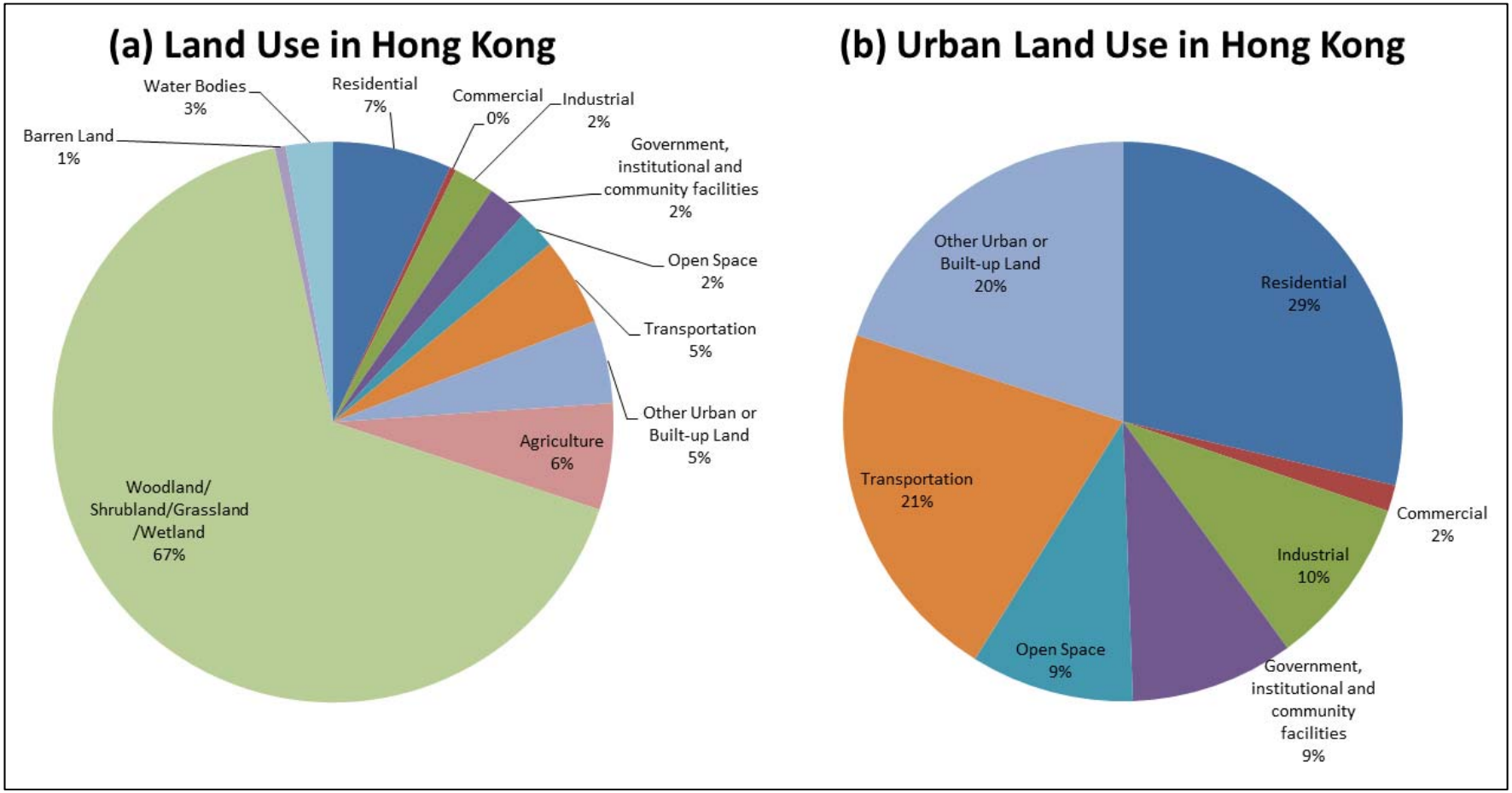

Figure 1.1 Land use in Hong Kong
(Source: Planning Department (2013))

UGS provision has been regarded as an important indicator of urban sustainability. Shen, Ochoa, Shah, and Zhang (2011) conducted a comprehensive review on sustainability indicators and proposed an International Urban Sustainability Indicators List (IUSIL). The IUSIL has four different dimensions, namely, environmental, economic, social, and governance. To achieve environmental sustainability, urban greening is one of the important indicators of sustainable land use. Similarly, UGS provision is an indicator of urban sustainability (Mega & Pedersen, 1998) and environmental dimensions of a green community (United States Environmental Protection Agency, 2013). UGS provision also serve as natural capital indicators of environmental sustainability for urban areas (Olewiler, 2006). Chiesura (2004) argued that UGSs contribute to a better quality of urban life by providing environmental, economic and social benefits, thus making them important components of sustainable development (Figure 1.2).

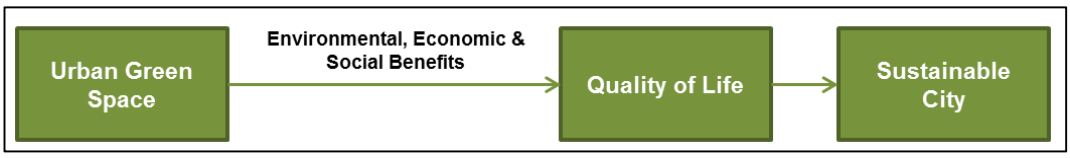

Figure 1.2 The conceptual linkage between UGS and urban sustainability
(Source: Chiesura (2004))

1.2 Urban Green Space (UGS) in Hong Kong

Hong Kong currently suffers from a limited number of UGSs. Although UGS provision in new towns is generally adequate, that in old districts is inadequate (Lo & Jim, 2012). Incompatible land use as well as poor security and hygienic conditions result in low-quality greenery in the UGS, particularly in the inner city area (Jim, 1994; Xue, Manuel, & Chung, 2001). Tian, Jim, and Tao (2012) explained that most green spaces in Hong Kong are located in the countryside. By contrast, UGSs are often fragmented and located along the road in medium- and high-density areas. Figure 1.3 shows examples of small-sized UGSs located along the road in Hong Kong. As can be seen, the facilities provided are limited, and the users suffer from noise and poor air quality.

Figure 1.3 Examples of UGSs along the road
(Source: Google Map)

Compared with other cities in China, Hong Kong has a higher percentage of green areas (mainly located in the countryside), but has an extreme shortage of UGS for a sustainable and quality living environment (Tian et al., 2012; Zhong & Lai, 2001). Lam, Ng, Hui, and Chan (2005) examined the environmental quality of UGSs in Hong Kong, and found that air quality and noise in the UGSs are not significantly better than the home environment. Therefore, the environmental functions of urban parks are limited and questionable. Despite the poor environmental quality, the UGSs serve important social functions (Lam, 2004; Lam et al., 2005). Groups of people, particularly the working class, the elderly and the unemployed, commonly engage in gambling, chess and chatting in parks, which serve as recreational venues (Lo & Jim, 2010a) (Figure 1.4).

Figure 1.4 Examples of activities in UGSs
(Source: Sing Tao Daily; Oriental Daily)

According to a recent survey by Demographia (2015), housing in Hong Kong was considered "severely unaffordable" among 360 cities in nine countries, namely, Australia, Canada, Hong Kong, Ireland, Japan, New Zealand, Singapore, the UK, and the US. The survey also identified Hong Kong as the most expensive market with the smallest houses. The emergence of "subdivided units" has drawn public attention to the quality of residential units in Hong Kong. These units refer to individual living quarters that have been subdivided into two or more smaller units for rental, and are often found in old buildings with crowded living environments, poor hygienic conditions, and non-existent fire prevention facilities (Transport and Housing Bureau, 2014). Prior studies showed that cramped and poor living conditions compel residents to use UGSs, which serve as extended living spaces for communal and recreational purposes (Kinoshita, 2001; Lam, 2004; Lo & Jim, 2010a). Therefore, UGSs play an important role in facilitating recreational activities in high-density areas, particularly in Hong Kong.

In this study, UGS is defined as a publicly owned and accessible open space with vegetation, e.g., parks, playgrounds, sitting-out areas, and gardens (Lo & Jim, 2012; Schipperijn, Bentsen, Troelsen, Toftager, & Stigsdotter, 2013; Wong, 2009).

1.3 Research Motivation

Schipperijn, Stigsdotter, Randrup, and Troelsen (2010) reported that studies on UGSs could be found in different fields, such as urban studies, leisure research, and physical activity research. Although these fields have different emphases, most studies aimed to identify the appropriate design or physical features to better fulfill the needs of users and stimulate the use of UGSs.

Previous research have examined several important UGS characteristics, such as park facilities and features, park maintenance, distance, size, and perceived safety (Bedimo-Rung, Mowen, & Cohen, 2005; Giles-Corti et al., 2005; Van Herzele & Wiedemann, 2003). Although these characteristics are considered as important factors influencing the use of UGSs, several researchers disagree with this finding (Schipperijn et al., 2013). For example, Lo and Jim (2010b) found that the quality of UGS was not correlated with the frequency with which individuals visited them. Schipperijn, Stigsdotter, et al. (2010) conducted a study on socioeconomic variables, size, and travel distance to green spaces and found no reliable predictors for the frequency of visiting the most used UGS.

Previous studies also investigated the attitudes of users towards UGSs, with the primary goal of understanding public perceptions of green spaces (Balram & Dragićević, 2005; Bonnes, Passafaro, & Carrus, 2011; Lafortezza, Carrus, Sanesi, & Davies, 2009). Meanwhile, Tang and Wong (2008) proposed that the concept of UGS depends on the cultural context of a given city. For example, in Hong Kong, UGSs are broadly defined to include parks, gardens, playgrounds, and sitting-out areas (Wong, 2009) of vegetated and open spaces within the city limits (Lo & Jim, 2010b). Tan, Wang, and Sia (2013) determined the park provision ratios in different cities and observed that the park area per capita in Asian cities (e.g., Hong Kong, Seoul, and Singapore) was smaller than that in Western cities (e.g., Stockholm, New York, and Los Angeles) (Table 1.1). Lo and Jim (2012) reported that Western cities have a relatively lower development density and better UGS provision, whereas UGS provision in Hong Kong is among the lowest in the world compared with other cities of similar size. Schipperijn, Stigsdotter, et al. (2010) argued that policymakers and planners should develop a reasoned understanding of the specific needs and preferences of city dwellers in addition to general solutions for green space because each UGS is unique.

Table 1.1 Park area per capita in selected cities

City	Park area (ha) per 1000 residents
Asian Cities	
Hong Kong	0.35
Seoul	0.52
Shanghai	1.06
Singapore	0.75
Western Cities	
Los Angeles	2.51
Melbourne	4.77
New York	1.86
Stockholm	7.38

Source: Tan et al. (2013)

Most of the relevant research on this topic was conducted in Western cities. As such, the salient attributes of UGSs in Hong Kong, which are comparatively smaller and inadequately managed and designed, should be identified (Lo & Jim, 2012). To date, no consensus on the preferred planning criteria regarding the location, quantity, and use of UGS has been achieved, which may be attributed to contextual and cultural diversity among cities (Maruani & Amit-Cohen, 2007).

Previous studies have neglected the complexity of the evaluative processes of users (Wang, Brown, Liu, & Mateo-Babiano, 2015) and focused on socioeconomic variables and intrinsic park features (Grove et al., 2006). Thus, a knowledge gap exists regarding the personal preferences and psychological constructs of users regarding the use of UGS in Hong Kong. For this reason,

public authorities should understand the key factors that influence the behaviours, attitudes, and perceptions of users so that they can design and provide better UGSs for the public (Jay & Schraml, 2009).

1.4 Research Question

As discussed previously, the majority of prior studies were conducted in Western cities and the desirable characteristics of UGS identified in these studies cannot be contextually applied in high-density cities, such as Hong Kong. Moreover, these studies may have ignored the psychological process of the UGS evaluation of users. Thus, the current study aims to answer the following research question:

What are the salient UGS attributes in Hong Kong? What is the influence of these salient attributes on the attitudes and behaviours of users towards these UGSs?

In this study, "attributes" are defined as features or qualities of UGSs that are psychologically perceived by users (e.g., the perceived adequacy of facilities and the perceived level of accessibility). Moreover, the salience of these attributes is based on the extent to which such attributes influence the attitudes and behaviours of users towards UGSs. The specific list of salient UGS attributes according to users in Hong Kong should thus be identified. This leads us to the following research question:

In addition to UGS attributes, what are the psychological factors influencing the attitudes and behaviours of users? How do attributes and psychological factors interact with each other?

The decision-making process of users does not simply consider UGS attributes. Therefore, determining how users are influenced psychologically in terms of their attitudes and behaviours towards the UGS is important. UGS attributes play an undeniable role in influencing their use. However, these attributes may interact with other psychological factors. This leads us to another important research question:

What can public authorities do to encourage the use of UGS?

With an understanding of the salient attributes and psychological factors influencing the attitudes and behaviours of users, public authorities may consider whether they can change the attributes of UGSs or influence the psychological factors to encourage public use of UGSs. By considering such factors, land resources could be used more effectively and the health of users in various aspects could be improved.

1.5 Aim and Objectives

In accordance with the aforementioned research questions, this study aims to examine the key factors influencing the use of UGSs in Hong Kong. The objectives are as follows:

- to identify the salient UGS attributes in Hong Kong and examine their influence on the behaviours of users;
- to develop and validate a conceptual model to explain the use of UGSs; and
- to draw policy and design implications for encouraging the use of UGSs.

1.6 Structure of the Thesis

This thesis consists of seven chapters.

Chapter 1 provides an overview of the background of Hong Kong and its UGS provision, the research motivation, as well as the aims and objectives of the study. This chapter also discusses the importance of the study and its relevance to the living quality of people in Hong Kong.

Chapter 2 presents a review of prior studies on UGS. The literature review makes specific reference to two key areas, namely, (i) important UGS characteristics and (ii) theoretical models to explain the use of UGS.

Chapter 3 outlines the research design of the study and explains the qualitative and quantitative research methods used in this study. This chapter also addresses the reasons for adopting a mixed approach design (qualitative and quantitative approaches). In addition, the hypotheses to be tested in statistical analyses are proposed and presented based on the literature review and the conceptual model. The data analysis methods, including exploratory factor analysis and partial least squares, are discussed and explained.

Chapter 4 discusses the development of a conceptual model on the use of UGSs. The main perspectives on the use of UGS from the fields of urban planning and social psychology are explained. Key concepts related to the use of UGSs are also identified and discussed.

Chapter 5 provides the findings of the study. The results of the qualitative and quantitative phases are presented. The results of the statistical analysis are also included.

Chapter 6 presents the discussion and implications of the study results. This chapter highlights the consistency of the findings of the present study compared with prior studies. Key implications related to UGS design and management are discussed.

Chapter 7 summarizes the key findings and discusses the contribution and significance of this study. The research limitations and future research are also presented.

1.7 Chapter Summary

This chapter introduces the background of land use and UGS provision in Hong Kong, a "land-hungry" city with severe shortage of developable land. This physical constraint calls for effective and sustainable land use. UGSs provide a variety of physical and psychological benefits for the urban population. Owing to their perceived benefits, prior studies have argued for the need to carry out city-specific studies. Moreover, these studies are warranted because city planners and green space managers need to gain a better understanding of the evaluative processes of users and how their behaviours are influenced. This study aims to identify the factors influencing the use of UGSs. Therefore, policy and design implications could be drawn based on this study's findings.

Chapter 2 Literature Review

2.1 Definitions of UGS

Although not all open spaces theoretically possess green features, e.g., plazas, squares, wide streets and pedestrian streets/areas, the terms "open space" and "green space" are often used interchangeably (Lee & Maheswaran, 2011; Swanwick, Dunnett, & Woolley, 2003). Tang and Wong (2008) proposed that the concept of open spaces varies depending on the context of cities. Maruani and Amit-Cohen (2007) defined urban open spaces as non-built areas dominated by a high level of "intrinsic naturalness." Prior studies have identified the key features of UGSs, which include recreational areas (Thompson, 2002), low-density urban development (Rietveld & Wagtendonk, 2004), cultural landscape for social gatherings (Law, 2002), areas of unsealed, permeable, and "soft" surfaces (Home, Bauer, & Hunziker, 2010), neighborhood spaces in residential communities (Abu-Ghazzeh, 1996), parks and spaces, and landscaped plazas or public squares associated with commercial development (Cybriwsky, 1999).

In addition to their physical features, UGSs are defined in terms of services provided, namely, recreational, scenic, psychological, social, educational and scientific, as well as an assimilation of values and moral attitudes to society and a conservation of natural values (Maruani & Amit-Cohen, 2007). Lo and Jim (2010b) defined UGSs as open spaces consisting of vegetated areas. In Hong

Kong, urban open spaces are defined in a rather extensive sense, and include parks, gardens, playgrounds, and sitting-out areas (Wong, 2009). Therefore, in this study, UGS is defined as publicly owned and accessible open space with vegetation, e.g., parks, playgrounds, sitting-out areas, and gardens (Lo & Jim, 2012; Schipperijn et al., 2013; Wong, 2009).

2.2 Benefits of UGS

Chiesura (2004) summarized three benefits of strategic importance, namely, environmental, economic and social aspects, concerning UGSs and their connection to a higher quality of life. Therefore, increasing the use of UGSs has become one of the issues in the political agendas (Schipperijn, Stigsdotter, et al., 2010).

Ulrich (1981) and Hartig, Mang, and Evans (1991) proposed that natural environments have a positive influence on psychological health. UGSs provide rejuvenating experiences for people who use them because they provide a sense of peacefulness and relief (Kaplan, 1995). Parsons and Daniel (2002) proposed that visual and nonvisual environmental aesthetic elements can also lead people to form emotional attachments and fondness for these spaces. Stress recovery theory (Ulrich, 1983) and attention restoration theory (Kaplan & Kaplan, 1989) explained that exposure to natural environments trigger psychological and/or physical recovery processes. These theories proposed that the environmental

features in a natural setting provide a breather from stress and a relief from attentional fatigue commonly experienced due to hectic urban living.

In addition to psychological benefits, the features of UGSs provide social benefits. Coley, Sullivan, and Kuo (1997) proposed that the natural features of UGSs attract larger and mixed groups of people, thereby increasing opportunities for social interactions. By contrast, the lack of green spaces is correlated with feelings of loneliness and lower level of perceived social support (Maas, Van Dillen, Verheij, & Groenewegen, 2009). Although these studies were conducted in poor neighborhoods, a study conducted by Sugiyama, Leslie, Giles-Corti, and Owen (2008) in a wealthier neighborhood indicated that UGS promoted a greater sense of cohesion and community among residents.

The natural features of UGS can also provide economic benefits that may reduce the costs of pollution reduction (Chiesura, 2004), such as air quality improvement, microclimate regulation, and noise reduction (Bolund & Hunhammar, 1999). Moreover, urban parks can serve as tourist destinations based on their aesthetic, historical and recreational value, creating employment and generating revenues at the same time (Holloway & Taylor, 2006). Previous studies also proved that proximity to UGSs lead to higher values of residential properties (Luttik, 2000; Wu, Wang, Li, Peng, & Huang, 2014).

2.3 Important UGS Attributes

Users appreciate UGSs if they are well maintained and able to fulfill specific needs of inhabitants within the city (Bonnes et al., 2011; Burgess, Harrison, & Limb, 1988). UGSs should be open and accessible to the public, well equipped and maintained, and provide opportunities for a wide range of social and physical activities. Bonnes et al. (2011) argued that missing features may lead to user complaints and dissatisfaction. Chiesura (2004) and Shan (2014) investigated the motives and emotional dimensions of experience from the perspectives of users through predetermined variables, such as use for sport, relaxation, and meditation. Certain design attributes, such as amenities, perceived usefulness, and accessibility (Lo, Yiu, & Lo, 2003), have been cited as the preferences of most users and, subsequently, their use of UGS. In a recent study of Lo and Jim (2012) in Hong Kong, citizens have been found to prefer a higher level of greenery, more seats, and larger UGSs. Despite these studies, a comprehensive list of important attributes that a UGS should possess has yet to be identified (Maruani & Amit-Cohen, 2007). Moreover, UGS quality may not be correlated with their use (Lo & Jim, 2010b). The important UGS characteristics identified by previous studies are discussed in the subsequent subsections, and the key studies are summarized in Table 2.1. Bedimo-Rung et al. (2005) argued that planners and managers of UGS should focus on changeable UGS attributes to address the preferences of users.

Table 2.1 Important UGS attributes

Prior studies and study areas	Bixler and Floyd (1997)	Van Herzele and Wiede-mann (2003)	Chiesura (2004)	Giles-Corti et al. (2005)	Kaczynski et al. (2008)	Schipperijn, Ekholm, et al. (2010)	A. Y. Lo and Jim (2012)
	United States	Belgium	The Nether-lands	Australia	Canada	Denmark	Hong Kong
Attributes							
Accessibility		✓		✓			
Size		✓		✓			✓
Facilities		✓		✓	✓		✓
Naturalness		✓	✓	✓		✓	✓
Safety	✓	✓		✓			

Raymore (2002) reported that environmental attributes would be perceived by users as facilitators in reality. Therefore, in planning physical changes to UGS, planners and managers must be aware of individual differences and needs. Planners and managers should develop a reasoned understanding of the specific needs and preferences of city dwellers in addition to general solutions for UGS (Schipperijn et al., 2010). Similarly Lo and Jim (2012) indicated that studies in Western cities may not be suited to the Hong Kong context.

2.3.1 Accessibility

Distance is an important attribute influencing the use of UGS (Giles-Corti et al., 2005; Grahn, 1994; Lee & Moudon, 2008; Van Herzele & Wiedemann, 2003). UGSs with reasonable accessibility offer potential health and social benefits to urban residents (Wang et al., 2015). According to Grahn and Stigsdotter (2003) and Nielsen and Hansen (2007), a threshold value of 300 m to 400 m encourages the use of UGS. However, Hillsdon, Panter, Foster, and Jones (2006) observed no clear relationship between accessibility of UGSs and behaviours of users. Similarly, Schipperijn, Stigsdotter, et al. (2010) did not detect reliable predictors for the frequency of use of UGS that had a reasonable size (>5 ha) within a reasonable distance (<600 m). Wang et al. (2015) argued that current planning models have simplistically been using physical proximity in measuring accessibility and that perceived access is more important than geographic access and proximity. Perceived accessibility is multidimensional, which considers not

only the physical distance to the UGSs but also the preferences and perceived safety of the users for whom the UGS have been designed (Wang et al., 2015).

2.3.2 Size

Large UGSs are generally preferred by users (Giles-Corti et al., 2005) because large parks can provide a sense of spaciousness that, in turn, allows users to move freely and participate in different types of activities without disturbing one another (Björk et al., 2008; Neuvonen, Sievänen, Tönnes, & Koskela, 2007). In the study conducted by Lo and Jim (2012), they found that Hong Kong residents prefer large parks. Although UGSs at the neighborhood level are generally accessible in compact cities, such as Hong Kong, the quest for conveniently located and large UGSs continues. Nevertheless, Van Herzele and Wiedemann (2003) proposed that distance and size criteria should be considered simultaneously for planning and designing UGS. Smaller UGSs in the city center would be acceptable to users because of their locational convenience compared with those in the urban fringe. Giles-Corti et al. (2005) also determined that, although people are more likely to use UGSs of good accessibility, their likelihood to use them increased if they are both accessible and large in size. Poudyal, Hodges, and Merrett (2009) reported that people are willing to trade proximity for the size of the UGS, indicating that users are willing to travel a longer distance to use a large UGS.

2.3.3 Facilities

Seating, paving, and sports and ancillary facilities are important attributes that support the activities of users in any UGS (Carr, 1992; Giles-Corti et al., 2005; Kaczynski, Potwarka, & Saelens, 2008; Van Herzele & Wiedemann, 2003). The facilities and their conditions (e.g., maintenance and quality) influence the preference of users in selecting their preferred UGS (Lee & Maheswaran, 2011). Therefore, maintenance and management of UGS are essential in providing quality facilities to users (Hillsdon et al., 2006; Lo et al., 2003).

Generally, the two groups of facilities are those that facilitate passive recreational activity (e.g., seating and picnic equipment) and those that facilitate physical activity (e.g., walking path, sports facilities, and sports court). Similarly, Kaczynski et al. (2008) discussed the difference between facilities and amenities. Facilities refer to features primarily designed for physical activity (e.g., trails and playgrounds), whereas amenities are features that support physical activity (e.g., washroom, drinking fountain, and seating). According to the findings of Shan (2014) and Sanesi and Chiarello (2006), users with different socio-demographic backgrounds are motivated to use UGSs for different purposes. For example, women are motivated to play with their children, whereas males are motivated to use UGSs for relaxation and quietness. This finding indicates the need to design different UGSs to satisfy various groups of users effectively (Jay & Schraml,

2009). Similarly, Van Herzele and Wiedemann (2003) proposed that a variety of facilities supporting a wide range of activities would increase the use of UGS.

2.3.4 Naturalness

Bolund and Hunhammar (1999) reported that human beings continue to depend on nature despite the urban intensification that has been going on. Ecosystems can provide a range of services, including air filtration, microclimate regulation, noise reduction and recreational and cultural values, which influence the quality of life in urban settings. People living in green environments are more likely to have better physical health (De Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003) and psychological health (Grahn & Stigsdotter, 2010). People desire to come in contact with and experience the natural environment (Bonnes et al., 2011; Burgess et al., 1988; Van den Berg & Ter Heijne, 2005). Hence, UGSs should incorporate natural features, such as trees, birdlife, and water (Chiesura, 2004; Coley et al., 1997; Giles-Corti et al., 2005).

Schipperijn, Ekholm, et al. (2010) and Chiesura (2004) stated that a natural setting in a UGS provides a quiet and peaceful experience for users. Serenity, contact with nature, and relaxation are the key motives encouraging users to visit UGSs (Coles & Bussey, 2000; Shan, 2014). Carles, Bernáldez, and Lucio (1992) reported that soundscape, unlike noise level, considers the level and source of sound in a specific context. Yang and Kang (2005) indicated that natural sounds are more preferable and influence users' choice of urban space. Van Herzele and

Wiedemann (2003) explained that contextual differences may influence users' expectations and evaluations of the UGS soundscape. For example, a specific noise level may be acceptable to users in an urban park, but may be unacceptable to users in a country park, which is expected to be more peaceful and quiet.

2.3.5 Safety

Previous studies highlighted that sense of safety is negatively influenced by natural features (Bixler & Floyd, 1997; Schroeder & Anderson, 1984). In contrast, Kuo, Bacaicoa, and Sullivan (1998) reported that the level of safety is positively influenced by natural features. According to Giles-Corti et al. (2005), perceived safety includes the presence of lighting, visibility of surrounding houses or roads, type of surrounding roads, and presence of crossings. Van Herzele and Wiedemann (2003) argued that level of safety is a basic condition that determines whether users would use a particular UGS. Therefore, a green and safe environment should be well planned and designed (Luymes & Tamminga, 1995). Safety would more likely be a concern of women and elderly people (Sanesi & Chiarello, 2006) probably because of their vulnerability to potential crime and danger (Harris, Jenkins, & Glaser, 2006; LaGrange & Ferraro, 1989). Prospect-refuge theory posits that environmental cues influence our sense of safety (Appleton, 1984). In relation to this, entrapment (blocked escape) and concealment (blocked prospect) are strongly correlated with perceived safety (Nasar & Jones, 1997). Planners and designers should consider

these principles to increase the sense of safety experienced from UGSs (Luymes & Tamminga, 1995).

2.4 Objective and Subjective Assessments of UGS

UGSs can be assessed using objective or subjective measurements (Steg, Van den Berg, & De Groot, 2012). A typical objective indicator is the percentage of an area covered by vegetation or water, whereas subjective indicators are based on the perception of respondents with regards the amount and/or quality of the UGSs in their respective environments. Coles and Bussey (2000) argued that the results of objective and subjective assessments could differ from each other because the former, which are usually developed by professionals, may not be fully consistent with the evaluations of users.

Previous studies employed objective measurements of UGS features, e.g., size, distance to UGS and facilities, in either expert assessment or geographic information system (Hillsdon et al., 2006; Lafortezza et al., 2009; Van Herzele & Wiedemann, 2003). In addition to the objective assessment of environmental features, Millington et al. (2009) indicated that self-reported environmental perceptions by users is a commonly used method. Scott, Evenson, Cohen, and Cox (2007) reported that perceived attributes are better predictors of behaviour than objectively measured environmental factors.

Although objective and subjective assessments may not be well correlated (Kaczynski, Potwarka, Smale, & Havitz, 2009), Schipperijn, Stigsdotter, et al. (2010) explained that subjectively measured factors are associated with the objectively measured factors through the experiences of users. Perceived environmental attributes have been proven to influence quality of life (Sugiyama, Thompson, & Alves, 2009), leisure activities (Giles-Corti et al., 2005; Sugiyama, Leslie, Giles-Corti, & Owen, 2009), stress restoration (Grahn & Stigsdotter, 2010), and psychological well-being (Gidlöf-Gunnarsson & Öhrström, 2007).

2.5 Behavioural Theories and their Applicability

Wang et al. (2015) argued that only a few studies on UGSs relied on behavioural theories, which can be used to obtain a better understanding of the attitudes and behaviours of users. In this section, four models were selected for discussion because they explain behaviours from different perspectives: theory of planned behaviour (TPB), which explains behaviours by personal utility (i.e., benefits versus costs); norm activation model (NAM), which considers the perceived consequences and moral concerns of people; theory of interpersonal behaviour (TIB), which proposes that behaviours are activated in a more habitualized manner; and health belief model (HBM), which focuses on health-related behaviours.

2.5.1 Theory of Planned Behaviour (TPB)

Theory of reasoned action (TRA) (Ajzen, Heilbroner, Fishbein, & Thurow, 1980; Fishbein, 1979) posits that the intention of an individual to perform certain behaviours is the immediate determinant of such behaviour; it also argues that behavioural intentions are influenced by two factors, namely, attitude and subjective norms. Attitude towards a behaviour is defined as a function of the beliefs of an individual towards a behaviour and a subjective evaluation of such behaviour (Fishbein & Ajzen, 1975). The belief component captures the knowledge and perceptions of a person about a certain behaviour. Meanwhile, a subjective norm or social pressure is a function of the perceived expectations of other individuals or groups who are important or close to a person and the motivation of such person to comply with these expectations (Fishbein & Ajzen, 1975). Pressure from or views of peers, family members, and neighborhood have a positive effect on one's behaviours.

However, the performance of certain behaviours is usually deterred by the lack of appropriate opportunities, knowledge, skills, and time (Liska, 1984). These circumstances limit the sufficiency of the TRA in explaining the behaviour of an individual. Therefore, the TPB extends the TRA by including an additional variable, which is perceived behavioural control (PBC) (Figure 2.1). PBC refers to the perception of an individual regarding his/her ability to manifest certain behaviours (Ajzen, 1991). Do Valle, Rebelo, Reis, and Menezes (2005)

explained that PBC reflects two key dimensions: external conditions and perceived ability of an individual. PBC is commonly operationalized as a set of control, facilitating and inhibiting factors, e.g., ease and opportunity; level of convenience; knowledge of how, what, and where to perform a behaviour; and provision of resources (Giles-Corti & Donovan, 2002; Heath & Gifford, 2002; Tonglet, Phillips, & Read, 2004).

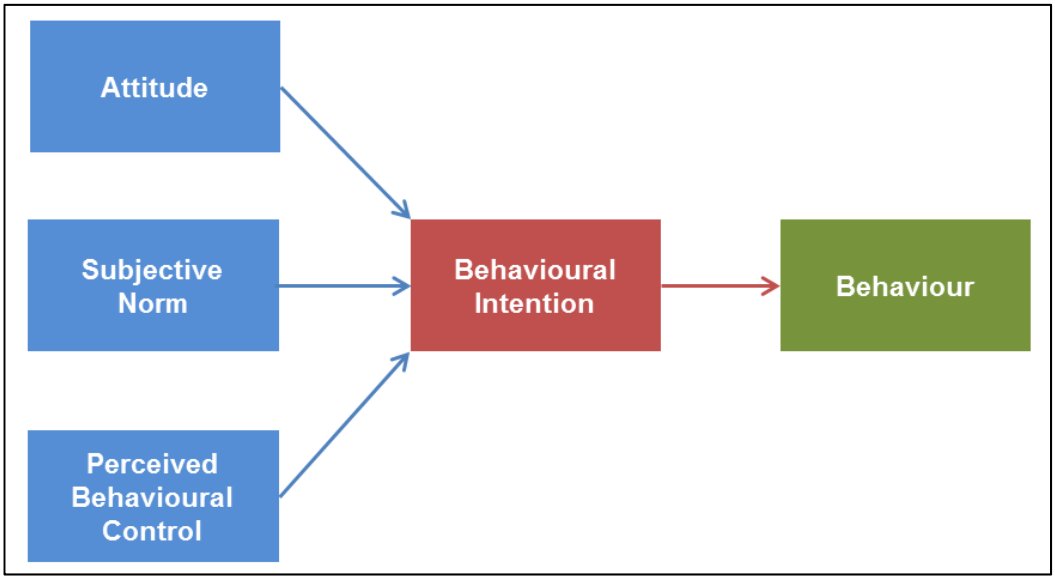

Figure 2.1 Theory of planned behaviour
(Source: Ajzen (1991))

The three TPB components are assumed to be determined by salient beliefs and the evaluations of such beliefs (Ajzen, 1991; Conner & Armitage, 1998). Attitudes refer to the salient behavioural beliefs of individuals, which indicate the perceived outcomes and the evaluation of such outcome. Subjective norm refers to normative beliefs, i.e., an individual's perception of the significance of other individuals' approval or disapproval of certain behaviours, and the motivation to comply, that is, the extent of the willingness of an individual to

comply with the preferences of other individuals. Finally, PBC is a function of control beliefs, which refer to whether resources and opportunities to perform the behaviour are accessible, and the perceived level of facilitation or inhibition. In prior studies, the three TPB components are measured either directly or indirectly. In direct measurements, respondents are asked to rate the components using a set of scales (Ajzen, 1991). In indirect measurements, the respondents are asked to rate certain beliefs and the valuation of those beliefs (Heath & Gifford, 2002). The measurements of TPB components can then be obtained by multiplying the strengths of the beliefs and the associated evaluation. Usually, direct measures are simpler and easier for respondents to answer, and are able to reveal the association between components and behaviour (Ajzen, 2002a).

Ajzen (1991) proposed that TPB is a general theory that can be applied in explaining all types of behaviours. TPB has been the focus of considerable attention in the literature and its efficacy in explaining behaviours has been proven (Armitage & Conner, 2001). TPB has been extensively adopted in attitude-behaviour studies, for instance, in the area of technology acceptance (Mathieson, 1991), the dishonest actions of college students (Beck & Ajzen, 1991), smoking (Godin, Valois, Lepage, & Desharnais, 1992), driving violations (Parker, Manstead, & Stradling, 1995), and the use of public transportation (Heath & Gifford, 2002). TPB is described as a "parsimonious" theoretical framework that includes major predictors with precise operational definitions of each construct (Armitage & Conner, 2001; Heath & Gifford, 2002).

The flexibility of adding variables allowed by TPB, as reported by Ajzen (1991), can significantly contribute to the explanation of certain behaviours. Many studies on attitude and behaviour have proposed adding variables to improve the predictive power of their respective models. For example, moral norms and awareness of consequences have been included to explain recycling behaviour (Wan, Shen, & Yu, 2014), self-identity and social support have been included to explain physical activity (Hamilton & White, 2008), and self-efficacy has been included to explain healthy eating behaviours (Povey, Conner, Sparks, James, & Shepherd, 2000). TPB had also been applied in predicting behaviours of using UGS and neighboring environment (Glanz, Rimer, & Viswanath, 2008; Rhodes, Brown, & McIntyre, 2006).

2.5.2 Norm Activation Model (NAM)

The NAM was originally developed for application in the field of prosocial behaviour, such as blood donation and voluntary work participation (Schwartz, 1977). The NAM proposes that behaviour is explained by four key factors, namely, personal norms, social norms, awareness of consequences, and ascription of responsibility. A personal norm can simply be interpreted as the rule that governs an individual in judging whether committing a certain behaviour is the right thing to do; this factor is conceptualized as feelings of moral obligation. The influence of social norms on individual behaviour is mediated by the personal norms. In addition, the NAM elaborates that the

correlation between personal norms and behaviour is moderated by one's awareness of consequences and the ascription of responsibility. Therefore, the relationship between personal norms and behaviour becomes stronger if individuals are aware of the consequences and feel a certain level of responsibility for such consequences (Figure 2.2).

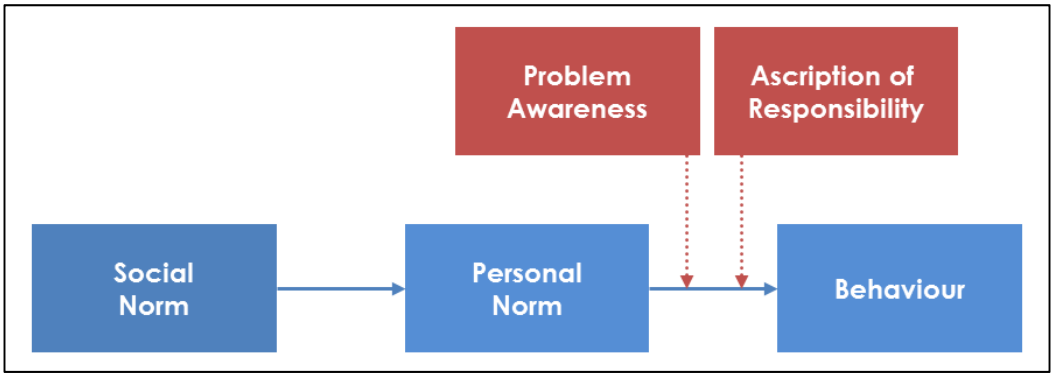

Figure 2.2 The norm activation model
(Source: Hopper and Nielsen (1991))

In a review of the NAM, Thøgersen (1996) reported that, in contrast to the concept proposed in TPB, the behaviour of an individual is not only based on costs and benefits but also on moral beliefs. Thøgersen (1996) further stated that the NAM can provide a more appropriate and reasonable basis for behavioural studies. This relationship has been confirmed by the study results of Hopper and Nielsen (1991) and Bratt (1999) on pro-environmental behaviour. If an individual performs a new behaviour, then social norms would direct his/her decision to commit an act. Social norms are internalized and become personal norms if the behaviour becomes recurrent. Therefore, in performing certain behaviour, individuals may be influenced, first, by social norms and,

subsequently, by personal norms (Davies, Foxall, & Pallister, 2002). The NAM has been adopted in research on behaviours involving moral considerations.

For studies on pro-environmental behaviours, such as recycling, energy saving or transportation use, moral considerations are involved in protecting the environment and conserving natural resources. Moral considerations refer to the concerns of an individual about his/her ethical and social responsibilities in performing a certain behaviour. However, Harland, Staats, and Wilke (1999) observed that moral norms increase modest variance when explaining behavioural intentions. Examples of other studies considering moral concerns include those pertaining to dishonest actions (Beck & Ajzen, 1991) and driving violations (Parker, Manstead, Stradling, Reason, & Baxter, 1992). However, the current study focuses on the use of UGSs, in which moral considerations are not a related concern. Thus, the NAM is not considered applicable to the current study.

2.5.3 Theory of Interpersonal Behaviour (TIB)

TIB (Triandis, 1980) (Figure 2.3) is a general theory of behaviour, which posits that the behaviour of an individual can be explained by three factors: behavioural intention, facilitating conditions, and habit. Behavioural intention refers to the likelihood of an individual to perform certain behaviours. Facilitating conditions refer to the factors that enhance the ease or difficulty of performing a certain

behaviour. Finally, habit is the reoccurrence of a behaviour that is processed automatically and unconsciously.

In TIB, behavioural intention is influenced by the cognitive component, affect component, social norm, and personal norm. Cognitive component refers to the perceived consequences of a behaviour, whereas affect component refers to the emotional state evoked by an individual in performing a behaviour. Meanwhile, social norm refers to the influence of others' opinions about performing a behaviour and the behaviour of other individuals. By contrast, personal norm refers to the feeling of personal obligation and responsibility in performing a behaviour.

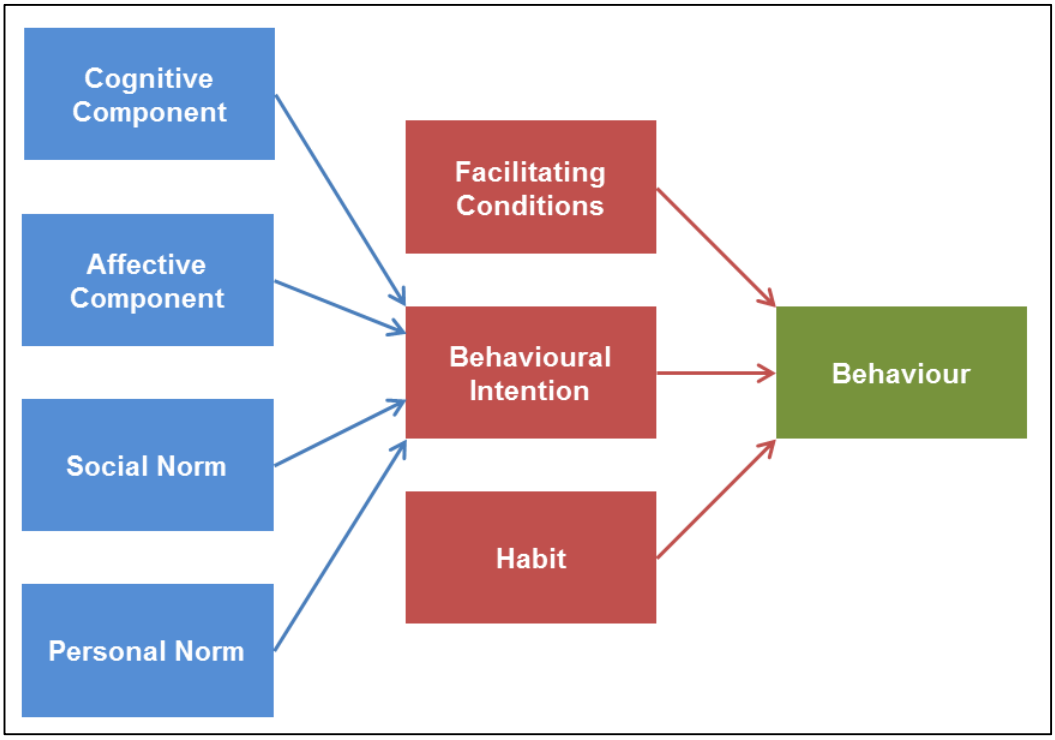

Figure 2.3 Theory of interpersonal behaviour
(Source: Triandis (1980))

Bamberg and Schmidt (2003) argued that TIB has received less attention from attitude-behaviour studies compared with TPB. One of the possible reasons is that TPB is a more parsimonious framework, which also shares certain similarities with TIB. Attitude in TPB is similar to the cognitive and affective components in TIB. Subjective norm in TPB is similar to the social norm in TIB, while PBC in TPB is similar to the facilitating conditions in TIB. The major difference between TIB and TPB is the construct of habit, which has been proven to influence individual behaviours, such as in the area of transportation use (Verplanken, Aarts, Van Knippenberg, & Moonen, 1998), recycling behaviour (Knussen & Yule, 2008), and physical exercise (Ouellette & Wood, 1998).

Although habit has been proven to be a significant predictor of behaviour, problems related to the measurement of this construct exist (De Bruijn et al., 2007). According to prior studies, habit can be measured using two ways. First, it can be measured by the self-reported frequency of performing a certain behaviour in the past (Gagnon et al., 2003; Knussen & Yule, 2008). Evidence showed a significant relationship between past and present behaviours (De Bruijn et al., 2007; Jackson, Smith, & Conner, 2003). However, Ajzen (2002b) argued that past behaviour is an insufficient measure of habit because frequently performing a behaviour does not necessarily indicate the presence of habit. By contrast, infrequent behaviours may indicate a habit of not performing that behaviour. In addition, self-reported past and present behaviours may be biased by common method variance, particularly when the behaviours of respondents

are assessed by similar response formats or questions. Second, habit can be measured using a procedure that used mental representations. For example, in studies on transportation use, Verplanken et al. (1998) and Bamberg and Schmidt (2003) asked participants to indicate what transportation they would choose in different hypothesized situations (e.g., visiting a friend, going to shops, and viewing a film). If a respondent is more stable in choosing a specific travel mode (e.g., driving a car) for different situations, then he/she has a stronger habit for a specific transportation mode. This measurement has been validated in different studies on transportation use (Aarts, Verplanken, & Van Knippenberg, 1997; Verplanken, Aarts, & Van Knippenberg, 1997). However, this measurement is limited to studies where behavioural choices are available, e.g., purchasing organic versus inorganic products and driving a car or taking a bus. In this study on UGSs, no readily comparable choices are available to users. Hence, it was not used in this study.

2.5.4 The Health Belief Model (HBM)

The HBM was developed in the early 1950s (Hochbaum, Rosenstock, & Kegels, 1952). The HBM was primarily developed to explain preventive health behaviours that individuals seek for illness, such as vaccination and healthy eating. The application of HBM has been extended to studies on illness and sick role behaviours (Champion & Skinner, 2008). Illness behaviour refers to the activities performed by individuals who perceive themselves as being ill, such as searching for definitions of their state of health and identifying remedies. By

contrast, sick role behaviour refers to individuals who consider themselves to be ill; such health behaviour includes seeking for and adhering to medical treatment provided by medical professionals (Kasl & Cobb, 1966). The model aims to explain health behaviours and guide interventions that help change health behaviours. Prior studies have applied HBM in an extensive range of health behaviours, e.g., AIDS prevention (Rosenstock, Strecher, & Becker, 1994), physical exercise (Bauman, Sallis, Dzewaltowski, & Owen, 2002; King et al., 1992), cessation of smoking (Prentice-Dunn & Rogers, 1986), cancer screening (Fulton et al., 1991; Sung et al., 2008), and adherence of patients to medical treatment (Horne & Weinman, 1999; Pham, Fortin, & Thibaudeau, 1996).

The HBM consists of three main factors influencing individual behaviours, namely, perceived threat, perceived benefits and barriers, and cues to action (Carpenter, 2010; Champion & Skinner, 2008; Hochbaum et al., 1952; Janz & Becker, 1984) (Figure 2.4). Perceived threat is driven by perceived susceptibility and perceived severity, indicating an individual's perception of the likelihood of having a disease and the seriousness of a disease, respectively. Perceived benefits refer to the belief about whether the action taken would reduce the risk or seriousness of a disease, while perceived barriers refer to the convenience, financial affordability, and psychological feelings of performing the behaviour. Cues to action represent the readiness to take action that can be triggered internally and externally. Examples of internal cues include symptoms, pain, and other physiological cues, while examples of external cues include media publicity, reminders from clinics, and other forms of health promotion.

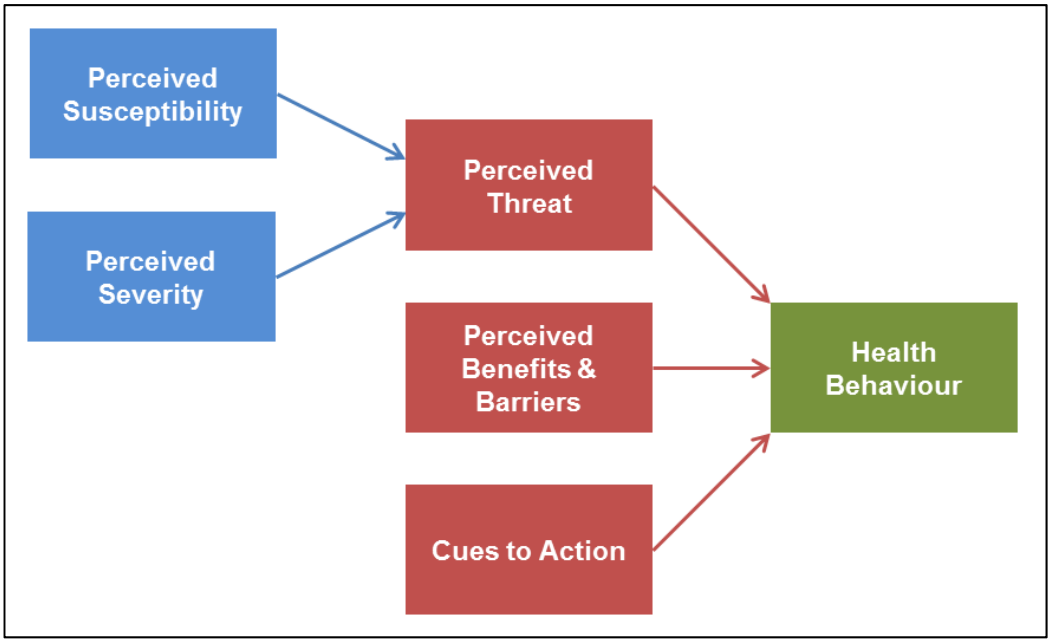

Figure 2.4 Health belief model
(Source: Hochbaum et al. (1952); Champion and Skinner (2008))

Users perceive UGS as having the function of promoting health (Lo & Jim, 2012), and doing physical exercise is a major motivation to use UGSs (Irvine, Warber, Devine-Wright, & Gaston, 2013; Shan, 2014). Prior studies revealed the association between UGSs and physical activity. Lee and Maheswaran (2011) explained that the UGS provides opportunities and space for people to participate in physical activities. UGSs can encourage high levels of physical activities, and thus, healthier physical status among their users (Potwarka, Kaczynski, & Flack, 2008; Richardson, Pearce, Mitchell, & Kingham, 2013). Schipperijn et al. (2013) proved that certain features of the UGS, such as walking routes and bike racks, can stimulate physical activity. In addition to physical health, Van den Berg, Maas, Verheij, and Groenewegen (2010) showed that the UGSs can reduce the effect of a stressful life and even increase the level of perceived mental health.

Physical exercise is a preventive health behaviour. Thus, the HBM may be applied in explaining key factors influencing the behaviours of people using UGS. However, the HBM does not include other non-health-related factors that influence health behaviours (Carpenter, 2010; Janz & Becker, 1984). For example, smoking may be due to habit and eating organic food may be due to identity and social factors. Furthermore, Janz and Becker (1984) argued that individuals engaging in physical exercise may be influenced by reasons beyond health, such as aesthetic reasons, while environmental factors, e.g., perceived safety or fear, may discourage people from engaging in healthy behaviours.

Researchers have attempted to compare the efficacy of TPB (Ajzen, 1991) and HBM (Hochbaum et al., 1952). Previous studies have proven that TPB has greater predictive utility than the HBM (Bish, Sutton, & Golombok, 2000; Quine, Rutter, & Arnold, 1998) and has better statistical model fit that the others (Şimşekoğlu & Lajunen, 2008). Godin and Kok (1996) proved the applicability of TPB in different types of health behaviours and its efficacy in explaining the behaviours of people. This finding may probably be due to the limitation of the HBM, which only includes health-related factors in the model, whereas TPB includes relatively general and different types of factors.

2.5.5 Comparison of the Behavioural Theories

Based on the previously presented discussion of the four selected behavioural theories, Table 2.2 categorizes and shows the key factors included in each of the models. By comparing the four selected behavioural theories, the attitudes, perceived consequences, social influence, knowledge, perceived ease or barriers, moral concerns, and reoccurrence of behaviours are determined to be the key factors influencing whether individuals perform or do not perform a behaviour. Although the NAM and HBM cover fewer aspects of the factors, TPB and TIB provide a broader coverage of the factors.

In this connection, TPB and TIB are considered the models that may provide a more comprehensive assessment of individual behaviours towards the use of UGS. Furthermore, TIB proposes that individual behaviours are influenced by moral concerns and habit; these two factors are not included in TPB because TPB assumes that individuals are utility maximizing and would select an alternative with the most positive behavioural consequences, rather than concerns related to social responsibility or moral norm. Although moral concerns are important indicators of several behaviours, for instance, recycling behaviours (Wan et al., 2014) and academic integrity (Beck & Ajzen, 1991), the use of UGS is of a different nature and does not involve any moral concerns. In relation to the factor of habit, the measurement of past behaviour is insufficient to indicate

habit, and this may lead to common method bias because of similar measures of self-reported behaviours.

Overall, TPB is considered the most applicable behavioural theory in investigating the use of UGS. As reported in prior studies, TPB is parsimonious and the operational definitions of each factor are precise and clear (Armitage & Conner, 2001; Heath & Gifford, 2002).

Table 2.2 Key factors influencing behaviours

	Factors						
Theory	Attitude	Perceived consequences	Social influence	Knowledge	Perceived ease/barriers	Moral concerns	Reoccurrence of behaviour
Theory of planned behaviour	Attitude	Attitude	Subjective norm	Perceived behavioural control	Perceived behavioural control		
Norm activation model		Awareness of consequences	Social norm			Personal norm; ascription of responsibility	
Theory of interpersonal behaviour	Cognitive and affect components		Social norms	Facilitating conditions	Facilitating conditions	Personal norm	Habit
Health belief model		Perceived benefits/perceived threats	Cues to action (external)		Perceived barriers		

2.6 The Knowledge Gaps

Drawing upon the aforementioned literature, three knowledge gaps are identified, and these are discussed below.

First, although prior studies have identified important UGS characteristics that would increase the use and attractiveness of UGS, a comprehensive list of common characteristics has yet to be finalized. Each city or area possesses its own characteristics and users have different preferences. As such, planners and policymakers should develop a sound understanding of the preference of users that are specifically relevant to a given city, in which the UGSs are located.

Second, previous studies excessively focused on intrinsic park features and socioeconomic variables, and failed to focus on the complexity of the evaluative and psychological processes of users. Related studies often attempted to investigate the relationship between UGS attributes and use frequencies of users. However, other psychological factors can also influence the behaviour of users.

Third, inconsistent results regarding the relationship between UGS characteristics and user behaviours were obtained. MacKinnon, Fairchild, and Fritz (2007) proposed that mediation may exist when the relationship between two variables in several studies is either proven statistically significant or insignificant. This finding indicates that the direct relationship between UGS

characteristics and use frequency of users may ignore certain important mediators.

2.7 Chapter Summary

This chapter first discusses the definitions and benefits of UGS, which specifically highlights the UGS definition adopted in this study and the importance of UGS to the urban population. The important UGS attributes contributing to the use frequency of users and UGS attractiveness are presented and discussed. The differences between the objective and subjective assessments of UGSs and their influence on the behaviours of users are then explained. Four behavioural models, including TPB, NAM, TIB and HBM, are explained and discussed. Based on the nature of each of the theories, TPB is selected as the most applicable theory in investigating the use of UGSs in the current study. Finally, three knowledge gaps are identified based on the literature review: (1) UGS attributes that are salient to high-density cities, such as Hong Kong; (2) psychological factors influencing the use of UGS; and (3) possible mediators of the relationship between UGS attributes and behaviours of users.

Chapter 3 Research Methodology

3.1 Overview

Based on prior empirical studies, hypotheses are proposed in this chapter. First, the hypotheses are stated to test the salience of the UGS attributes. Second, the hypotheses are proposed to investigate the influence of the socio-psychological factors, with specific focus on the social influence. Third, these assumptions are proposed to test the relationship between UGS attributes and socio-psychological factors.

This study used a mixed-method approach that combines qualitative and quantitative approaches. The qualitative approach aimed to elicit important attributes of UGSs from the users through interviews, using the repertory grid technique (RGT). This technique helps collect views from UGS users without predetermined factors (Berg, Lune, & Lune, 2004). This technique would help us obtain a better understanding of users' preferences related to UGSs as it overcomes the limitations of structured methods that may ignore several important UGS attributes perceived by the users.

Subsequently, the quantitative approach used survey research for which the questionnaire was designed based on the findings of the qualitative interviews and literature review. This approach helps enhance the generalizability of the

qualitative findings (Johnson, Onwuegbuzie, & Turner, 2007) and how these findings can be associated with other theoretical constructs derived from TPB and the attitudinal measurements derived from prior UGS studies. Figure 3.1 shows a flowchart illustrating the key steps of the research methods used in this study.

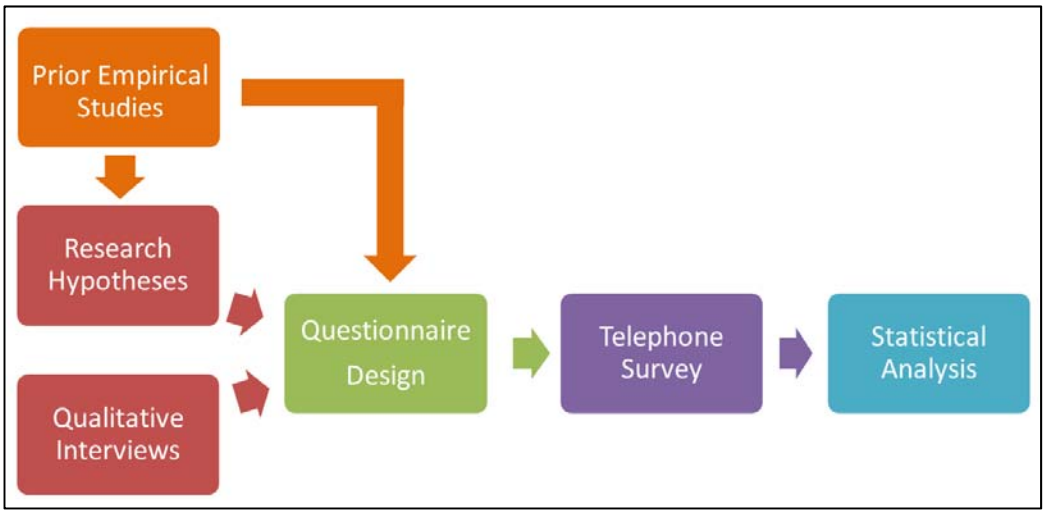

Figure 3.1 Flowchart of the research design

3.2 Hypotheses Development

3.2.1 The Influence of UGS Attributes on the Attitudes and Behaviours of Users

Although the attitudes and preferences of users and the salient UGS characteristics are investigated and considered critical elements in designing and planning the UGS, no comprehensive list of well-established (psychological) constructs for people has been established in relation to their use of UGSs (Home et al., 2010). Moreover, considering the contextual and cultural diversity among

cities, no consensus on the preferred planning criteria regarding the location, quantity, and use of UGS has yet to be achieved (Maruani & Amit-Cohen, 2007). Grove et al. (2006) argued that prior studies excessively focused on socioeconomic variations in the attitudes towards the UGSs and their evaluation. Although some factors influencing the use of a particular UGS have been examined in prior studies, these studies have generally relied on structured surveys that may have ignored other factors considered by users when they evaluate and compare UGSs in their locations. Coshall (2000) indicated that understanding individual preferences is important because, for example, although natural features are often employed in studies on UGS, the meaning of "natural features" may vary among users. On the one hand, naturalness may refer to green elements, wildlife, and clean air; on the other hand, it may refer to a sense of peacefulness to varying extents, singly or in certain combinations. Therefore, less structured ways to tap into the perceptions and preferences of users could serve as a more valid method of identifying the salient attributes of UGS held by users (Olson & Muderrisoglu, 1979). From this perspective, planners and managers should consider the subjective assessments of users in addition to planning physical adaptations to UGSs.

In the context of Hong Kong, UGS provision is lower than that in Western cities (Lo & Jim, 2012) and even in other Asian cities (Tan et al., 2013). Several prior studies argued that people in Hong Kong tolerate the poor environmental quality and size of UGSs because of crowded living conditions (Kinoshita, 2001; Lam, 2004). Meanwhile, other studies reported that Hong Kong citizens prefer UGSs

with a high level of greenery, more seats, and large size (Lo & Jim, 2012). Therefore, identifying a specific set of salient UGS attributes in Hong Kong is essential. Such salient attributes would help city planners and designers in developing a specific solution to address the unique needs of users in the city. Therefore, in this study, a list of salient UGS attributes identified by Hong Kong users would be identified through a less structured method.

UGSs that are well maintained and possess certain characteristics (e.g., facilities and features) fulfilling the needs of users would likely gain the appreciation and satisfaction of users (Bonnes et al., 2011; Burgess et al., 1988). Therefore, UGS attributes are expected to influence the attitude and use frequency of users. Several prior studies had confirmed these relationships (Giles-Corti et al., 2005; Wang et al., 2015). In other words, if a user is more satisfied with the UGS attributes, then he/she will have a more positive attitude towards the UGS and have a higher level of intention to use it.

In relation to the attitudes of users towards the UGS, prior studies had developed different measurement scales. Carrus, Passafaro, and Bonnes (2004) validated a measurement scale on attitudes towards the UGS, which measures how people feel about the associated importance of urban greening. Balram and Dragićević (2005) proposed a construct of usefulness of the UGS, which refers to how individuals perceive the benefits of using UGSs. Meanwhile, Bonnes et al. (2011) proposed an attitudinal measurement of the perceived quality of the UGS, which

includes adequacy, design, conditions, and equipment of the UGS. Therefore, the following hypotheses are proposed (Figure 3.2):

Hypothesis A1 (H_{A1}): UGS attributes positively influence the users' attitudes towards UGS.

Hypothesis A2 (H_{A2}): UGS attributes positively influence the perceived usefulness.

Hypothesis A3 (H_{A3}): UGS attributes positively influence the perceived quality.

Hypothesis A4 (H_{A4}): UGS attributes positively influence the intention to use of users.

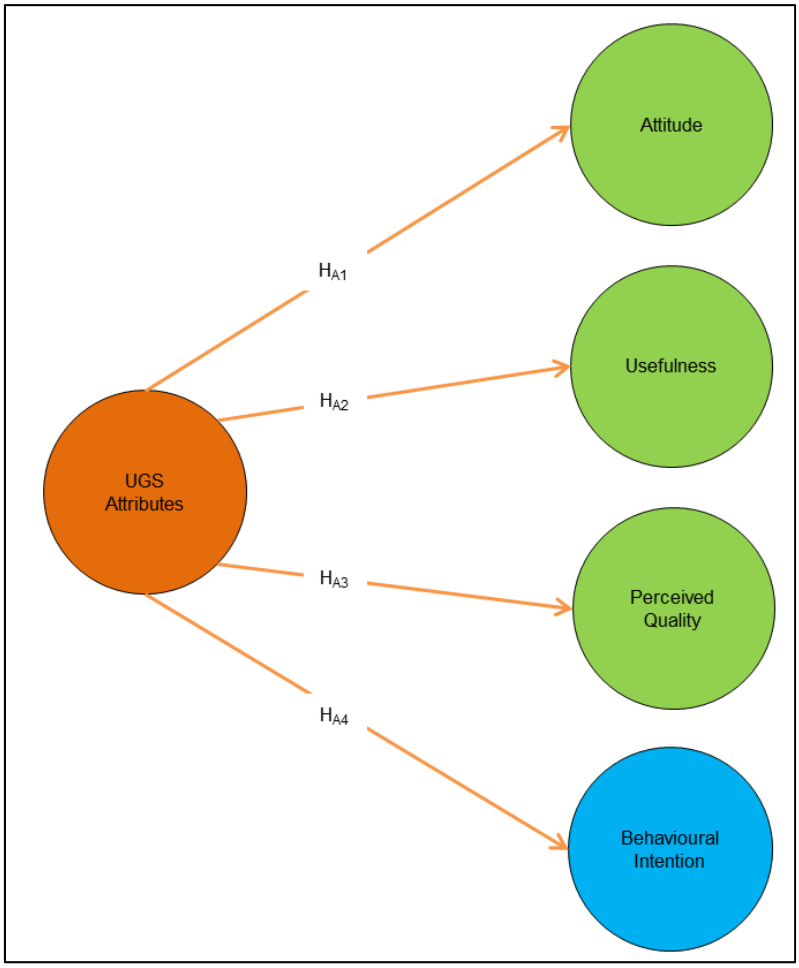

Figure 3.2 Hypotheses on the salience of UGS attributes

3.2.2 Socio-psychological Influences on the Use of UGS

As discussed previously in Chapter 2, TPB accounts for three main predictors of behavioural intention: attitude, subjective norm, and PBC. Carrus et al. (2004) developed an attitudinal measurement of urban greening, which has been proven to adequately cover the complexity of attitudes, and is considered as a useful tool that can provide support for urban planning decisions. Therefore, the attitudinal measurement of urban greening is considered appropriate for use in this study.

TPB proposes that the intention of an individual to perform a certain behaviour is the immediate determinant of that specific behaviour. In the current study, behaviour is operationalized as self-reported past behaviour in the use of UGS.

Hypothesis B1 (H_{B1}): Attitude positively influences intention to use UGS.

Hypothesis B2 (H_{B2}): Subjective norm positively influences intention to use UGS.

Hypothesis B3 (H_{B3}): PBC positively influences intention to use UGS.

Hypothesis B4 (H_{B4}): Behavioural intention positively influences UGS use.

Ajzen (1991) reported that TPB allows flexibility to include additional variables to the model; moreover, the addition of variables can improve the predictive power of certain behaviours. Stern (1992) argued that environmental behaviours are influenced by the knowledge of people about the perceived costs and benefits. In the study of Tobler, Visschers, and Siegrist (2012), perceived benefits are proven as significant predictors of behaviour in the context of climate change. Davies et al. (2002) explained in their study of recycling behaviour that a higher awareness level of desirable outcomes of certain behaviour would increase the intention to perform that behaviour. Meanwhile, Bamberg and Schmidt (2003) stressed that TPB assumes the individual to be a "utility-maximizing actor" (p.

267) and that the individual would select an alternative with the most positive behavioural consequences.

Balram and Dragićević (2005) developed an attitudinal measurement scale of urban greening, and found that individuals are influenced by two intercorrelated factors, namely, behaviour and usefulness. In the current study, perceived usefulness is operationalized as how individuals perceive the benefits of using UGSs, such as for recreation, relaxation, contribution to quality of life, and increment of property value. Although (Ajzen, 1991) measured attitudes in terms of the beliefs of an individual in the outcomes of behaviours based on his/her evaluation of such outcomes. Therefore, in TPB, attitudes are related to the awareness of consequences or benefits. A number of studies have considered awareness of consequences a construct in different fields (Shih & Fang, 2004; Wan et al., 2014). Attitudes in these studies are operationalized as the feelings of individuals about certain behaviours (e.g., good and useful). By contrast, awareness of consequences/usefulness emphasizes the individual's knowledge of the consequences of his/her behaviour. Measuring constructs of perceived usefulness from attitudes enhances the level of conceptual preciseness. In other words, if an individual perceives a higher level of benefits or usefulness of UGS, then he/she is more likely to use the UGS. Thus, the following hypothesis is proposed:

Hypothesis B5 (H_{B5}): Perceived usefulness positively influences intention to use UGS.

The perceived quality of neighborhood UGS is significantly and positively associated with sense of community (Francis, Giles-Corti, Wood, & Knuiman, 2012). In addition to emotional attachment, Sugiyama and Thompson (2007) defined environmental supportiveness as the extent to which the environment facilitates or hinders behaviour. Environmental supportiveness includes environmental cues and aesthetic features, which attract activities and behaviours (Thompson, 2013). UGSs may contain attractive environmental features that drive or motivate behaviour, such as well-designed and good quality facilities. Therefore, if the quality of UGSs is positively perceived, then an individual is more likely to use or perform certain activities in the UGS. Meanwhile, Bonnes et al. (2011) drew upon the indices of perceived residential environment quality developed by Bonaiuto, Fornara, and Bonnes (2003), and proposed a construct of the perceived quality of UGSs. Given that the perceived quality of UGSs has been proven to be significantly correlated with the frequency of use of spaces, the following additional hypothesis is proposed:

Hypothesis B6 (H_{B6}): Perceived quality positively influences intention to use UGS.

Social cognitive theory (Bandura, 1989) posits that the behaviours of people are a response to what they learn from watching others within the contexts of particular physical and social environments, thus highlighting the importance of subjective norms in TPB. Schipperijn, Stigsdotter, et al. (2010) argued that urban

planners and facilities managers should be well aware of sociocultural facilitators in addition to the physical environment of UGSs. Raymore (2002) reported that interpersonal facilitators are individuals or groups with increased participation in leisure activities. Lo and Jim (2010a), meanwhile, discussed the importance of social qualities in influencing users to visit UGSs and proved that community quality is a more important predictor compared with physical aspects of parks. Subjective norm is a direct predictor in TPB; however, subjective norms may function as more than just a direct predictor of behaviour. For instance, Caldwell and Darling (1999) argued that the relationship between partying among adolescents and substance use are moderated by peers and resistance to peer pressure. As discussed previously, subjective norm in TPB is defined in a similar nature (i.e., a function of the perceived expectations by significant others and the motivation of a person to comply with the expectations) (Fishbein & Ajzen, 1975). Therefore, the moderating effect of subjective norm is proposed to be investigated.

Supposing that an individual has a favorable attitude towards urban greenery, but feels that the subjective norm does not encourage or promote the use, this individual is likely to have a low intention to use UGSs. By contrast, if an individual has a weak attitude towards urban greenery, but is under effective facilitation by the subjective norm, then he/she would still have a low intention to visit. In the field of health psychology, perceived social support has been observed to act as a positive moderator of the relationship between attitude and behavioural intention of healthy eating (Povey et al., 2000). Similarly, Cheung

and Vogel (2013) proved in their study on e-learning technologies that subjective norm is a significant moderator of such relationship. Therefore, the following hypothesis is proposed:

Hypothesis B7 (H_{B7}): Subjective norm has a positive moderating effect on the relationship between attitude and behavioural intention.

Ajzen (1991) proposed that PBC increases the motivation of an individual to perform a certain behaviour, which is considered his/her perceived competence of performing the behaviour. In the context of healthy eating, Povey et al. (2000) considered perceived social support to be a negative moderator of the relationship between PBC and intention. In other words, if an individual perceives a higher level of assistance and information received through social contacts with individuals or groups, then the PBC becomes a weaker predictor of behavioural intention. However, perceived social support is different from the subjective norm of TPB. In TPB, perceived social support refers to the assistance an individual receives in performing a behaviour, whereas subjective norm refers to the perceived pressure received from other individuals (Povey et al., 2000; Wallston, Alagna, DeVellis, & DeVellis, 1983). In this connection, if an individual receives a high level of support from other individuals in performing a behaviour, then he/she will be less influenced by his/her own perceived knowledge and ability to perform such behaviour probably, because assistance from other individuals may overcome the difficulties or barriers of a behaviour. In a study on online shopping, Lee, Shi, Cheung, Lim, and Sia (2011) argued that

social influence strengthens the influence of perceived ease of using an online system. Similarly, for the use of UGSs, if an individual experiences a strong subjective norm encouraging the use of UGSs and perceives a high level of ease to use UGSs, then he/she is more likely to use them. However, if an individual experienced a low level of ease to use UGS, then he/she will still be unlikely to use them even with a strong social influence. Hence, the following hypothesis is proposed:

Hypothesis B8 (H_{B8}): Subjective norm has a positive moderating effect on the relationship between PBC and behavioural intention.

Subjective norm has also been observed to be moderator in other fields. In a study on cloud computing users conducted by Chi, Yeh, and Hung (2012), they found that subjective norm positively moderates the relationship between perceived risk and usage intention. This means that if an individual is highly influenced by subjective norm, then he/she will not decrease usage intention, even with an increase in perceived risk. A similar result has been reported by Lam, Baum, and Pine (2003) in the area of tourism research, and in their study they found that subjective norms positively moderate the relationship between unmet expectations and job satisfaction. If an individual is prone to follow what others think, then he/she is more likely to ameliorate the negative effect of unmet expectation of work benefits and atmosphere on job satisfaction. Although these studies are indirectly related to leisure research or use of UGSs, they proposed that subjective norm has a powerful influence on behaviour, and that individuals

tend to ameliorate the negative effects of other factors. Therefore, we propose that, if an individual is highly influenced by subjective norms, then the usefulness and perceived quality of UGSs would become weaker predictors of behavioural intention. The following hypotheses are thus proposed:

Hypothesis B9 (H_{B9}): Subjective norm has a negative moderating effect on the relationship between usefulness and behavioural intention.

Hypothesis B10 (H_{B10}): Subjective norm has a negative moderating effect on the relationship between perceived quality and behavioural intention.

As discussed previously, the proposed hypotheses on the socio-psychological influences on the use of UGS are shown in Figure 3.3.

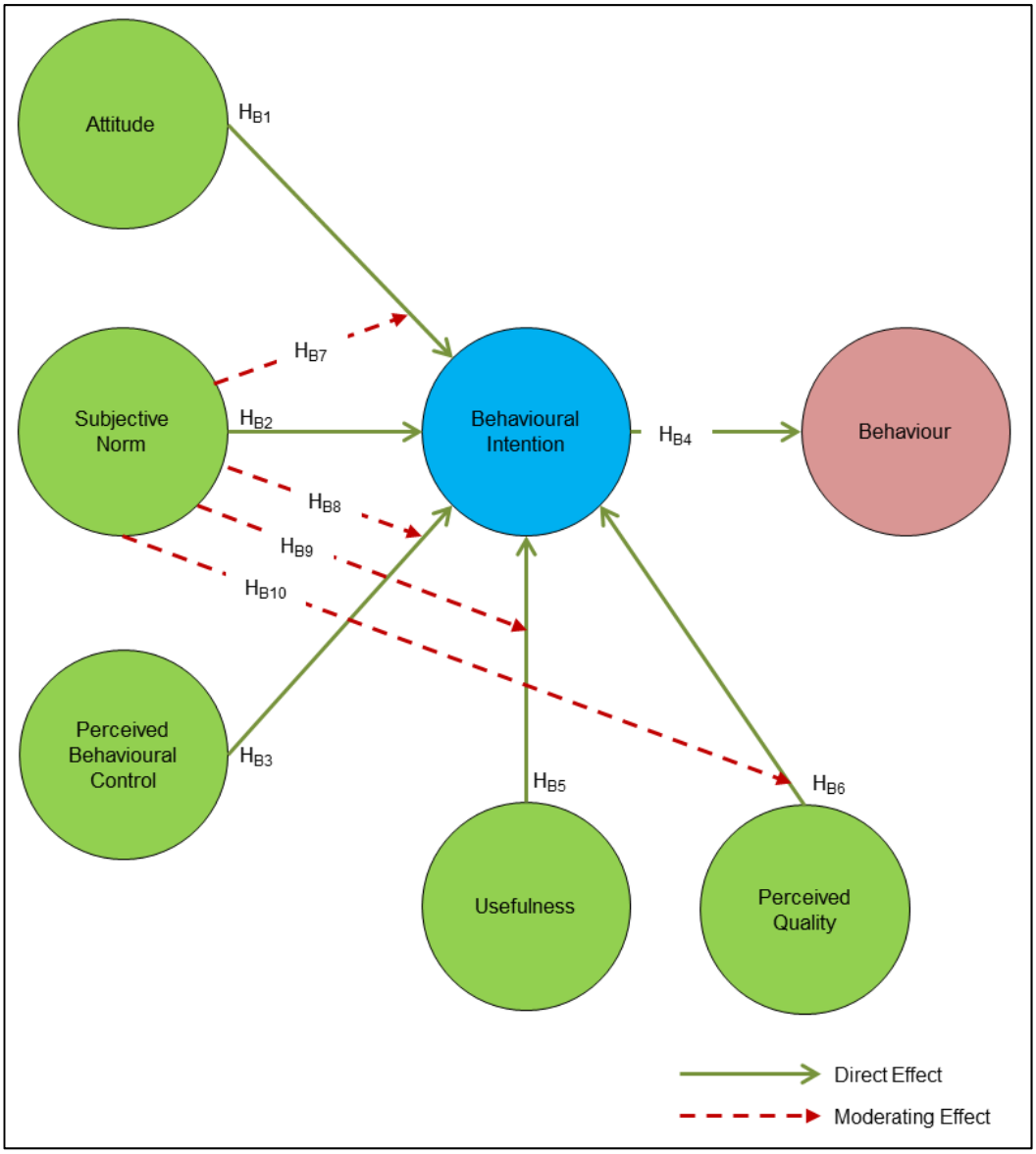

Figure 3.3 Hypotheses on the socio-psychological influences on the use of UGSs

3.2.3 Mediating Role of Attitudes and Perceived Behavioural Control

Although perceived attributes have been proven to significantly influence the behaviour of users in UGSs, TPB (Ajzen, 1991) assumes that all other factors, such as socio-demographics, general beliefs and values, indirectly influence behaviour intentions via the three components, i.e., attitude, subjective norms,

and PBC. Conner and Armitage (1998) described TPB as "a theory of the proximal determinants of behaviour," with a description of the processes of how beliefs and attitudes influence behaviour.

Miller (1956) reported that, although individuals may hold many beliefs (internal cognitive content), they can only invest efforts in attending to a limited number of beliefs. In comparison, attitudes are a fairly stable evaluative disposition that makes individuals behave positively or negatively towards an objective. In the context of UGS usage, a large number of attributes (e.g., facilities, green features, and maintenance) shape behaviours. Fishbein and Ajzen (1975) explained that beliefs are formed when an individual associates specific objects with certain attributes. Therefore, as discussed previously, users are unable to invest efforts in attending to an extensive range of attributes. These attributes help users acquire attitudes that are more stable dispositions towards UGSs, which in turn, influence behaviour.

Wang et al. (2015) argued that accessibility is a stronger predictor compared with physical proximity of UGSs. This result is consistent with that reported by (Holman, Donovan, & Corti, 1996), who determined that perceived proximity and accessibility (i.e., major roads) influence the frequency of use of urban open spaces. The construct of perceived accessibility is conceptually similar to the idea proposed by Wong (2009). Generally, distance and proximity to public transportation are salient UGS attributes that influence users' perceived ease or difficulty in using UGS **(**i.e., PBC), and subsequently, their behaviorial intention

to use such UGSs. The following hypotheses on the mediating effects of attitudes are thus proposed:

Hypothesis C1 (H_{C1}): Perceived attributes positively influence behavioural intentions to use UGS.

Hypothesis C2 (H_{C2}): Perceived accessibility positively influences behavioural intentions to use UGS.

Hypothesis C3 (H_{C3}): Attitude positively influences behavioural intentions to use UGS.

Hypothesis C4 (H_{C4}): Attitude mediates the positive relationship between perceived attributes and behavioural intentions to use UGS.

Hypothesis C5 (H_{C5}): Attitude mediates the positive relationship between perceived accessibility and behavioural intentions to use UGS.

Hypothesis C6 (H_{C6}): PBC positively influences behavioural intentions to use UGS.

Hypothesis C7 (H_{C7}): PBC mediates the positive relationship between perceived accessibility and behavioural intentions to use UGS.

Stern, Dietz, and Guagnano (1995) argued that the prediction effect of general attitude on behaviour is uncertain. By contrast, general attitude predicts specific attitude, which then yields more accurate results in predicting behavioural intention (Do Valle et al., 2005). Balram and Dragićević (2005) developed an attitudinal measurement of the perceived usefulness of UGSs, which is operationalized as how individuals perceive the benefits of using them (e.g., for recreation, relaxation, contribution to quality of life, and increment of property value). Given that perceived usefulness is considered as a more specific attitude compared with the general attitude towards the UGSs, the following hypotheses are thus proposed:

Hypothesis C8 (H_{C8}): Perceived usefulness relates positively to behavioural intention to use UGSs.

Hypothesis C9 (H_{C9}): Perceived usefulness mediates the positive relationship between attitude and behavioural intentions to use UGSs.

The aforementioned hypotheses for testing the mediating effects of attitudes and PBC are shown in Figure 3.4.

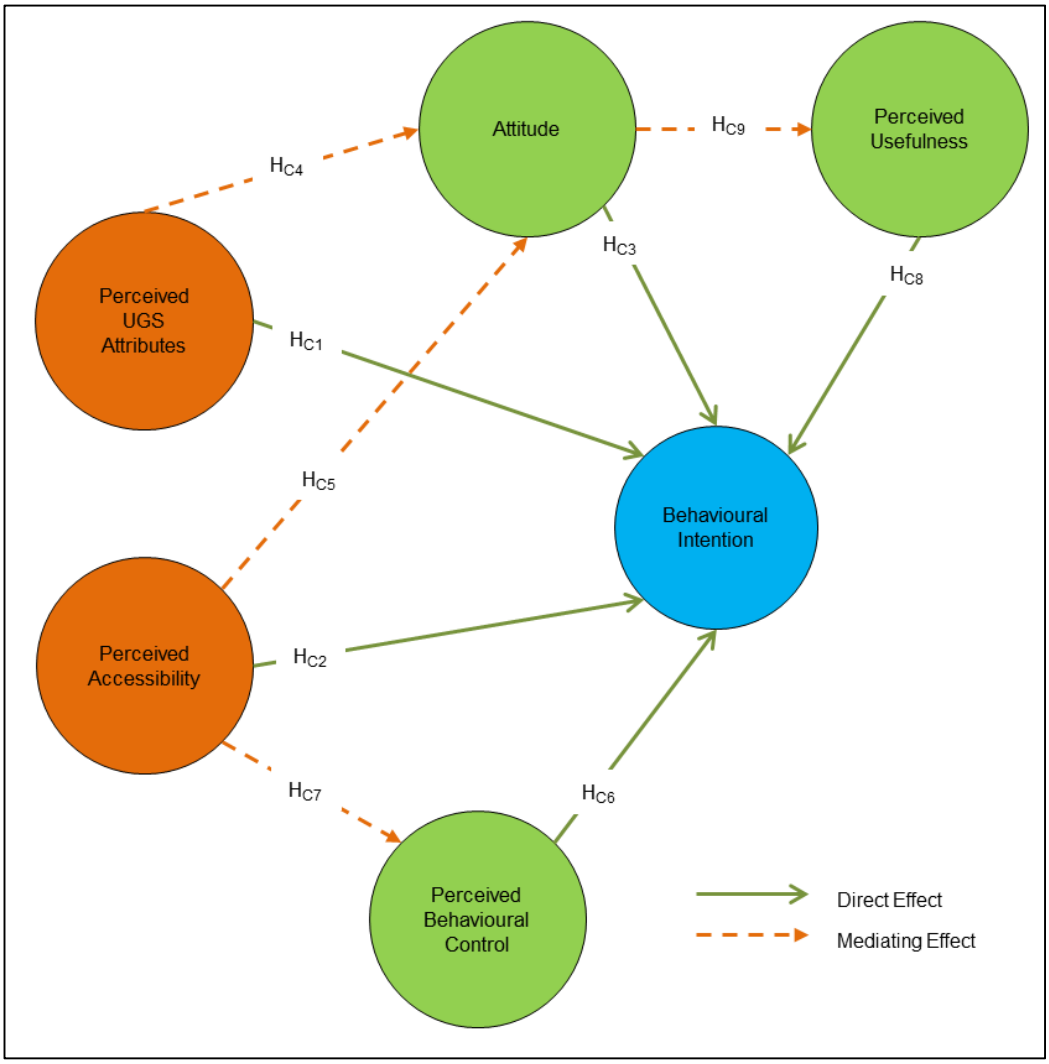

Figure 3.4 Hypotheses on the mediating effects of attitudes and PBC

3.3 Repertory Grid Technique (RGT)

3.3.1 Background and Justifications

Kelly (1955) developed the RGT primarily for use in the field of clinical psychology. This instrument allows patients to express personal propositions in their own words and explain how they make sense of the world. The process of

unfolding these hidden constructs helps clinicians develop a deeper understanding of the thoughts and behaviours of the individuals who expressed them. In recent years, the RGT has been extended from psychology into other fields to help identify personal constructs in other domains, such as organizational behaviour (Huang, Wright, Chiu, & Wang, 2008; Wright, 2008), travel and tourism (Coshall, 2000; Lawton, 2005), and environmental studies (Home et al., 2010). Although RGT is originally designed for application on an individual basis, contemporary studies have demonstrated its feasibility for analyzing data generated from a group of respondents (Fransella, Bell, & Bannister, 2004; Jankowicz, 2005). Hence, the RGT serves as an alternative method for qualitative research.

Although in-depth interviews and focus groups are commonly used in social research, Kelly (1955) argued that individuals construct systems that are often unarticulated or implicit, which results in the complex elaboration of these constructs. Therefore, directly asking respondents to describe and explain their opinions about an object, e.g., UGS and city life, may be ineffective. To resolve this problem, the RGT serves as a cognitive mapping tool and an alternative method to elicit and analyze the mental models of individuals using a structured interview methodology. The instrument assumes that a mental model is a "construct system", which is defined as "a way in which things are construed as being alike and yet different from others" (Kelly, 1955).

Therefore, a construct is expected to be bipolar or dichotomous in nature, e.g., good and bad, pretty and ugly, or happy and sad. Individuals use what they have learned from their experiences to understand how the world works, and the way by which an individual understands his/her personal reality is built from contrasts rather than absolutes (Jankowicz, 2005; Kelly, 1955). Therefore, in the context of the current study, describing and elaborating the adequacy of facilities provided in the UGS would be difficult for users, but identifying and naming the differences among different UGSs in terms of adequacy of facilities would be easier.

3.3.2 Sample Size Requirement

Given that the RGT is qualitative in nature, Pike (2003) indicated in his study on tourists that the necessary sample size to use RGT can be relatively small; furthermore, in a given target population, continual sampling is recommended until such samples reveal no new constructs. Thus, the RGT has no specific sample size requirements. In this case, sample size is determined by whether additional samples would help identify new constructs.

RGT has commonly been used in exploratory and qualitative research with sample sizes of approximately 20 respondents (Home et al., 2010; Huang et al., 2008; Pike, 2003; Wright, 2008). For example, Wright (2008) interviewed 10 senior executives in a study of business strategy, Home et al. (2010) conducted

17 interviews to identify preferred urban landscapes, and Huang et al. (2008) interviewed 15 supervisors and 15 subordinates to leader-member exchanges from the perspectives of supervisors and subordinates, respectively.

3.3.3 Element Selection and Elicitation

Elements refer to the object or stimuli considered to be important within a study. Examples of elements in prior studies include tourist attractions (Coshall, 2000), leaders and subordinates (Huang et al., 2008), food products (Thompson, 2002), information systems (Phythian & King, 1992), and organizations (Daniels, Johnson, & de Chernatony, 2002). The selected elements can either be supplied by the researchers or provided by the respondents themselves (Tan & Hunter, 2002). Reger (1990) argued that supplying elements to respondents is ideal when the researcher is interested in learning and comparing more responses from respondents based on a fixed set of elements. For example, Coshall (2000) provided 11 museums and galleries as elements, with the aim of understanding the tourists' images of each travel destination. By contrast, asking respondents to provide their own elements would enhance the relevance of the elements. For example, Huang et al. (2008) asked respondents to name nine colleagues to examine the relationship between leaders and members in the organizational context.

The present study asked respondents to elicit their own elements because Hong Kong has more than 1500 UGSs, including parks, playgrounds, waterfront areas,

and sitting-out areas (Leisure and Cultural Services Department, 2007). Consequently, providing a complete list of UGSs in Hong Kong to the respondents or identifying a common list of UGSs for which all the interviewees had visited may be impractical.

The interviews with UGS visitors were conducted in eight separate districts of Hong Kong. During the interviews, each respondent was given nine descriptors for UGS elicitation. Seven pilot interviews with UGS users (who were not part of the study) revealed eight descriptors (E1 to E8) that generally presented their perceptions of UGS for this study. The ninth descriptor (E9), "An Ideal Urban Green Space," represents an exemplar element that is extensively used in RGT interviews to facilitate comparisons made by respondents (Home et al., 2010; Huang et al., 2008). The nine descriptors are listed below.

E1: A Good Quality Urban Green Space

E2: An Average Quality Urban Green Space

E3: A Bad Quality Urban Green Space

E4: An Urban Green Space I Visit Most Often

E5: An Urban Green Space I Visit Sometimes

E6: An Urban Green Space I Visit Least Often

E7: A Large Urban Green Space

E8: A Small Urban Green Space

E9: An Ideal Urban Green Space

The respondents were asked to recall eight different UGSs that they had visited in the past six months and to assign one of the eight descriptors (E1 to E8) to each of the UGS they had identified. Then, the respondents were asked to write the names of the eight UGSs on different paper cards (e.g., Figure 3.5). If a respondent was unable to recall eight different UGSs, then another interviewee would be approached. The respondents were told not to assign E9 ("An Ideal Urban Green Space") to any of the UGSs they had visited. The respondents were then instructed to imagine an ideal UGS that could be included in this category.

Figure 3.5 Examples of elicited UGSs

3.3.4 Construct Elicitation

Dyad or triad approaches are commonly used in the process of eliciting constructs from participants. The primary difference between the two approaches is whether the interviewees are asked to compare two or three elements each time. Comparing between two elements is generally easier for interviewees to explain similarities or differences than comparing among three elements. However, the current study used the triad card method (Fransella et al., 2004), in which three UGSs are compared at each time, for construct elicitation because triad comparisons allow elicitation of more cognitively complex constructs (Reddy & Caputi, 1999).

First, each interviewee was presented the nine UGSs (using UGSs that they had previously identified) in groups of three. Second, the interviewee was asked, "In what way are any two of these similar, but different from the third?" A typical response was in the form of a construct, such as "These two UGSs are similar because they are quiet, whereas that one is different because it is noisy." In this case, the bipolar construct "quiet and noisy" emerged as the "construct system," as defined by Kelly (1955). The elicited constructs were then used as the salient attributes with which the respondents evaluated and compared their selected UGSs. Then, the interviewees were asked the same question for at least six different combinations of the UGSs until no new constructs were elicited. An example is shown in Table 3.1.

Table 3.1 An example of a completed repertory grid

Construct	Element (E)									Contrast
	E1	E2	E3	E4	E5	E6	E7	E8	E9	
Sufficient seating	✓	✓								Insufficient sitting
Provision of ancillary facilities, e.g., washroom and drinking machine					✓	✓				No provision of ancillary facilities
Many green features, e.g., trees and greenfields							✓		✓	Few green features
Clear division of areas	✓			✓						Unclear division of areas
Extensive range of facilities; suitable for all ages		✓						✓		Narrow range of facilities
Uncrowded			✓			✓				Crowded

Note: The highlighted cells of each row show examples of triad comparison. ✓ indicates two similar elements identified by the respondent.

3.3.5 Data Reduction

Although the RGT is an instrument that is primarily intended to identify idiosyncratic constructs that represent individual knowledge (Baldwin, 1992), Cammock, Nilakant, and Dakin (1995) reported that constructs can be expressed in group perceptions through data reduction. Data were reduced based on three data reduction criteria: (i) repeated constructs, (ii) unclear bipolarity, and (iii) ambiguous and vague schemas. Two expert raters were then invited to participate in the data reduction process, as proposed by Cammock et al. (1995). The raters were separately asked to group the elicited constructs that they believed had similar or repeated meanings and to remove the constructs that they believed did not have clear bipolarity and schemas. All of the disagreements between the raters about which constructs should be grouped and which constructs should be removed were discussed between them until a consensus was reached.

3.4 Questionnaire Development

The questionnaire consists of three parts (Appendix 1). The first part includes questionnaire items of the constructs elicited from the RGT interviews. For example, a construct of sufficient seating versus insufficient seating was formulated into the questionnaire item statement, "The urban green space provides sufficient seating." The respondents then rated the items (attributes of UGSs that they had visited) on a seven-point Likert scale, where 7 indicated the

most positive view and 1 indicated the most negative view (i.e., 1 = strongly disagree; 7 = strongly agree).

The second part includes indicators for the attitudinal and behavioural constructs based on the literature on UGSs and the TPB theoretical framework, i.e., perceived usefulness, perceived quality, attitudes, subjective norm, PBC, behavioural intention, and (past) behaviour. Similar to the first part of the questionnaire, all the measurement items in this part were measured in a seven-point scale. A four-item, seven-point scale developed by Balram and Dragićević (2005) was used to measure overall usefulness of UGSs. Usefulness is operationalized as how individuals perceive the benefits of using UGSs, such as recreation, relaxation, contribution to quality of life, and increment of property value. Five items were adopted from Bonnes et al. (2011) to measure perceived quality of UGSs in this study, which included adequacy, design, conditions and equipment of UGS. Attitudes were measured using the five-item attitudinal measurement towards urban green developed by Carrus et al. (2004). This is operationalized as how people feel about and the associated importance of urban greening. The components of subjective norm, PBC, behavioural intention, and behaviour were adapted from studies that employed TPB (Ajzen, 1991; Wang et al., 2015) and studies that focused on use of UGSs (Schipperijn, Stigsdotter, et al., 2010).

Finally, the third part of the questionnaire included questions that solicited demographic information (e.g., gender, age, education level, monthly income,

type of housing, and UGS provision within the housing development). The socio-demographic information collected is mainly used to assess the sample representative in comparison with the population profile.

To enhance internal validity, a pilot test was organized, in which 20 copies of the questionnaire were randomly distributed. Some wordings in the questionnaire were then refined according to the comments given by the respondents. In addition, the questionnaire was amended based on the comments made by two experienced researchers. UGSs are defined in this study as publicly owned and accessible open spaces with vegetation; hence, the Chinese term of UGSs was adopted from the government's document. A background on UGSs and some examples were included at the beginning in the questionnaire to provide respondents a better idea regarding the UGS definition adopted in this study.

3.5 Telephone Survey

3.5.1 Justifications

Table 3.2 shows the comparison of different survey methods based on their relative advantages and disadvantages. Given that all Hong Kong residents aged 18 and older were defined as the target population in this study, the telephone survey allowed a randomized process in sampling compared with mail, street and web survey. Therefore, the questionnaire was administered as a telephone survey.

Street surveys are often considered as convenience sampling in nature (Neuman, 2013), particularly, this study's aim is to study UGS users in Hong Kong, rather than in a specific neighborhood or district. Although it may be possible to apply stratified sampling by identifying respondents in different districts or neighborhood, this is often based on an assumption that people living in the same districts are homogenous in relation to their preferences of UGS and demographic background. Therefore street survey was not selected as a method for the current study.

In addition, although online survey is efficient and low cost, it may only be able to reach a specific groups of respondents sharing similar attitudes and preferences (Couper, Traugott, & Lamias, 2001; Grandcolas, Rettie, & Marusenko, 2003). Therefore web survey was not selected for this study because of its inability to adequately cover the entire population of Hong Kong.

Mail survey allows random sampling by randomizing the postal address of residents; however, it is limited to using a questionnaire with simpler and fewer questions (Malhotra, 2012). The questionnaire in this study contained over 60 questions that may deter respondents' willingness to complete and return it. In comparison, using a telephone survey with the interviewer reading the questions requires less effort from the respondents to complete the questionnaire.

Therefore, compared with other forms of survey, telephone survey is considered as the most effective way to reach the wide population of Hong Kong residents. In addition, this questionnaire survey does not involve any physical stimuli to be shown and it is not necessary to use personal survey methods (Malhotra, 2012; Neuman, 2013). Therefore the telephone survey was chosen for the current study.

Table 3.2 Comparison of survey methods

	Sampling	Cost	Complexity of Questions	Use of Physical Stimuli
Telephone Survey	Random	Moderate	Medium	No
Street Survey	Non-random	High	High	Yes
Online Survey	Non-random	Low	Low	Visual only
Mail Survey	Random	Low	Low	Visual only

While mobile phones have become increasingly popular, conducting a landline telephone survey may exclude potential mobile-only respondents and lead to non-coverage bias (Keeter, 1995). This bias is insignificant when the percentage of the population without landline telephone is low (Blumberg, Luke, & Cynamon, 2006). In Hong Kong, the penetration rate of landline telephone in households is 100.3%, that is, a density of 100.3 lines per 100 households (Office of the Communications Authority, 2015). This penetration rate is among the highest in the world (Hong Kong Trade Development Council, 2013); thus, landline telephone survey is still considered a valid, although imperfect, data collection method that would cover the entire population (Lau, 2015).

3.5.2 Procedures

The survey was conducted between 6 P.M. and 10 P.M. on weekdays of the month of August, 2013 using computer-assisted telephone interviews. Conducting the telephone survey in the evenings of weekdays would increase the opportunity to reach the wage earners and homemakers of a family. Telephone numbers were selected randomly by the computer system from residential telephone directories, which were produced by a local telecommunication service provider, Hong Kong Telecommunications Limited. The telephone directories were published between 2005 and 2012. The computer system merged the published directories in these years and removed the overlapping numbers.

When telephone contact was successfully established with a target household, one person aged 18 years or older was selected from the household members that were present and available using the "next birthday" rule. This rule means that the interviewer asked the household member who answered the phone call to identify the household member who is next in line to have a birthday. Then, the "next birthday" member is selected to complete the survey. Using the "next birthday" rule is a quick and easy method of randomly selecting respondents from among household members.

3.6 Statistical Analysis

3.6.1 Chi-square Test

Chi-square test is a nonparametric test used that is commonly used to compare the expected and observed frequencies in a certain category (Field, Miles, & Field, 2012; Levin, Fox, & Forde, 2013). In this study, chi-square tests were conducted to examine whether significant differences exist between the composition of the sample and the composition of the population. If $p > 0.05$, then no significant difference exists between the expected frequencies (population composition) and observed frequencies (sample composition) for the socio-demographic variables. This finding indicates that the composition of the sample is statistically similar to that of the population for a specific demographic variable.

3.6.2 Exploratory Factor Analysis

Using the statistical procedure of exploratory factor analysis, a principal components analysis with varimax rotation was applied to group the constructs elicited from the RGT into a small number of interpretable underlying factors. Kaiser eigenvalue criterion was used to determine the number of factors that shall be retained before proceeding with the analysis (Nunnally, 1981). Factors

with eigenvalues greater than 1 were retained, and those with eigenvalues less than 1 were considered nonsignificant and then excluded.

The suitability of the data for factor analysis were assessed by the Kaiser-Mayer-Olkin (KMO) measure of sample adequacy and Bartlett's test of sphericity (Hair, Black, Babin, & Anderson, 2013). A KMO measure value greater than 0.5 is considered minimum. Hutcheson and Sofroniou (1999) reported that KMO values can be interpreted as acceptable (0.5 to 0.7), good (0.7 to 0.8), very good (0.8 to 0.9), and excellent (>0.9). Bartlett's test of sphericity is generally used to test the null hypothesis that the variables in the population correlation matrix are uncorrelated. In other words, the test checks whether a certain redundancy exists between the variables for grouping. If $p < 0.05$, then the correlation matrix is not an identity matrix (indicating that the variables correlate with each other). Therefore, factor analysis can be used to group the variables into a smaller number of factors.

Variables are considered "highly loaded" and salient to the interpretation of a factor when the loadings are greater than 0.4 (Field et al., 2012; Sidique, Lupi, & Joshi, 2010). Using this criterion, the variables are grouped together in the appropriate factor categories. Each factor would be described based on these variables and assigned descriptive names. Cronbach's alpha coefficient for each factor is also computed to test the reliability of scales of the item variables. A generally acceptable lower limit is 0.7 (Hair, Black, et al., 2013).

3.6.3 Partial Least Squares-Structural Equation Modeling

Structural equation modeling (SEM) measures the latent, unobserved concepts based on multiple observed indicators (Chin, 1998a; Jöreskog & Sörbom, 1989). Two major statistical approaches are used to estimate structural equation models, i.e., covariance-based approach and variance-based partial least squares (PLS) approach (Hair, Ringle, & Sarstedt, 2011). Compared with covariance-based SEM, PLS is more suitable for theory development and is not sensitive to small sample sizes (Hair et al., 2011; Jöreskog & Wold, 1982; Lu, Kwan, Thomas, & Cedzynski, 2011; Reinartz, Haenlein, & Henseler, 2009). PLS is thus more suitable in the current study because of two reasons: one of the key objectives of the current study is to develop a model to explain the use of UGSs, and there are a relatively high number of hypotheses to be tested (Henseler, Ringle, & Sinkovics, 2009). The statistical software application "SmartPLS 2.0" (Ringle, Wende, & Will, 2005) for PLS-based path modeling was employed to measure the causal model.

Hair et al. (2011) suggested a rule of thumb wherein the minimum sample size for PLS analysis should be 10 times the largest number of hypothesised relationships directed to a particular dependent variable. As shown in Figure 4.3, the behavioural intention variable has the largest number (i.e., nine) of variables directed to it. Therefore, the minimum sample size required for this study is 9 x 10, that is, 90. Alternatively, statistical power analysis can be performed to

obtain the required sample size (Akter, D'Ambra, & Ray, 2011). By using the G*Power 3.1 software (Faul, Erdfelder, Lang, & Buchner, 2007), the adequate sample size can be calculated based on the significance level (α) of the hypothesis test, the effect size (f^2) and the highest number of predictors (n_p) directed to a dependent variable (Cohen, 1988). The sample size required for this study is 166 ($\alpha = 0.05$; $f^2 = 0.15$; $n_p = 9$). An effect size of 0.15 means that a medium-level relationship strength would be detected by the statistical analysis (Cohen, 1988), and this effect size is commonly used to estimate the adequacy of the sample size (Akter et al., 2011).

PLS analysis (Chin, 1998b) was accomplished in two steps. First, the PLS measurement model was evaluated by examining the convergent and discriminant validities, as well as the composite reliability of the indicators. The convergent validity and composite reliability tested the relationships among indicators within the same constructs, i.e., questionnaire items (indicators) measuring the same variable (construct) should be highly correlated with each other. The measurement scales were evaluated based on the following criteria (Chin, 1998b; Fornell & Larcker, 1981):

(i) All indicator factor loadings should be significant and exceed 0.5.

(ii) Composite reliability should exceed 0.7.

(iii) Average variance extracted (AVE) by each construct should exceed 0.5.

Cronbach's alpha score is also a common measure to determine the internal reliability of each construct, i.e., the intercorrelations among indicators within a construct. A generally acceptable low limit is 0.7 (Hair, Black, et al., 2013).

Furthermore, the discriminant validity of indicators tests whether indicators within different constructs are unrelated (Campbell & Fiske, 1959), that is, indicators measuring different constructs should be uncorrelated. A rule for assessing discriminant validity requires that the square root of the AVE should be greater than the correlations between the construct and any other construct in the model (Chin, 1998b; Fornell & Larcker, 1981).

In the second step of PLS analysis, the structural model was assessed to confirm whether the hypotheses specified by the proposed model were statistically significant with the available data. Path significances were determined by running the model using a bootstrap resampling routine with cases (the responses collected by the telephone survey) and 1000 subsamples. This bootstrap resampling routine is a nonparametric method that assesses the significance level of PLS estimates (Chin, 1998b), in which subsamples are generated by randomly selecting a case from the data set. In the current study, the significance of each hypothesized relationship included in the research model was examined based on the path coefficients (β) and *t*-statistics of each hypothesized relationship. The positive or negative path coefficient of a relationship indicated whether an independent variable increased or decreased the magnitude of the dependent variable, respectively. Hypothesis tests were conducted to test the proposed

models of the study. The degree of freedom (*df*) is number of subsamples – 1 (Henseler et al., 2009) (i.e. 1000 – 1 = 999). One-tailed t-test should be used because all the hypotheses proposed in this study are directional, i.e. hypothesized positive or negative relationships (Kock, 2014). According to the one-tailed *t*-test (*df* = 999), the 0.05 significance level, or $p < 0.05$, requires a *t*-value > 1.645; the 0.01 significance level, or $p < 0.01$, requires a *t*-value > 2.326; and the 0.001 significance level, or $p < 0.001$, requires a *t*-value > 3.090.

R^2 values of 0.25, 0.50, and 0.75 in the structural model of PLS can be interpreted as weak, moderate and substantial, respectively (Hair et al., 2011). In contrast to covariance-based SEM, PLS does not provide various methods for the validation of models, such as χ^2, GFI and other related measures (Henseler & Sarstedt, 2013). However, the criterion of goodness of fit (GoF) for PLS was proposed by Tenenhaus, Vinzi, Chatelin, and Lauro (2005) as the geometric mean of the average communality and the average R^2 as stated below. The average communality is the average proportion of variance explained by the indicators for a specific variable, and is an index indicating the measurement quality of each variable (Fornell & Larcker, 1981; Tenenhaus et al., 2005). GoF is defined as small (0.35), medium (0.50), and large (0.61) (Latan & Ghozali, 2012), and is computed as follows:

$$GoF = \sqrt{\overline{communality} \times \overline{R^2}}$$

.

3.6.4 Statistical Control for Demographic Variables

Socio-psychological theories, such as TPB (Ajzen, 1991), NAM (Schwartz, 1977), generally assumes that demographic variables indirectly influence behaviours via social and psychological factors. Nevertheless, previous studies on UGS have showed that the demographic background (e.g., age, gender) could be one of dominated factors to influence the use of UGS (Jim & Shan, 2013; Lo & Jim, 2012; Payne, Mowen, & Orsega-Smith, 2002; Roovers, Hermy, & Gulinck, 2002). To fully account for the demographic differences among UGS users, four control variables, namely, gender, age, educational level, and monthly income, were selected based on the results of the previous UGS studies.

To estimate the effect of the control variables, the demographic variables should be included in PLS path analysis as independent variables. By comparing the results with the PLS path model without including the control variables, their impact on the results is substantial if they significantly increase the variance explained of the endogenous construct, or if they change the significance of the relationships (Hair, Ringle, & Sarstedt, 2013). According to Carlson and Wu (2011), statistical control can be used to estimate a "purified" or "controlled" relationship with other extraneous or meaningful variables accounted for. This means the contribution of an independent variable to a dependent variables can be isolated and alternative explanations of the statistical relationship can be ruled out (Atinc, Simmering, & Kroll, 2011; Carlson & Wu, 2011). In this study,

controlling for the demographic variables can minimize the possibility of confounded results.

3.6.5 Common Method Variance

CMV may arise when conducting research with a single instrument, particularly self-reported measures (Malhotra, Kim, & Patil, 2006; Meade, Watson, & Kroustalis, 2007). CMV leads to spurious relationships between measures, which may threaten the validity of the conclusions in studies (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). As the data collected in the telephone survey of this study were self-reported and based on the same survey instrument (i.e., the questionnaire), the potential occurrence of CMV was definitely a major consideration.

Harman's single-factor test is straightforward for CMV without incurring additional resources (Craighead, Ketchen, Dunn, and Hult (2011). The test is conducted by including all of the survey items in an exploratory analysis. CMV would be present if a single factor emerges from the factor analysis or if a factor accounts for a substantial amount of variance (Podsakoff & Organ, 1986). In this case, the threat of common method bias is considered to be high if a single factor accounts for more than 50% of variance (Harman, 1976; Messerschmidt & Hinz, 2013).

Ylitalo (2009) reported that the common techniques for controlling CMV are not always applicable to PLS owing to the differences in model estimation. An approach for assessing CMV in studies applying PLS (Dong, Xu, & Zhu, 2009; Pavlou, Liang, & Xue, 2006; Rönkkö & Ylitalo, 2011) was used in the current study. Moreover, a proxy for CMV was generated by conducting a factor analysis of all of the measurement items; this proxy was included in the model of this study as a predictor for the endogenous construct. Podsakoff et al. (2003) proposed that the first emerging factor is the proxy because it is the "best approximation of CMV" (p. 893). CMV is apparent if the proxy changes the significance of the relationships and significantly increases the variance explained of the endogenous construct.

3.7 Chapter Summary

This chapter presented the development of hypotheses, and also explained the rationale of the qualitative and quantitative research methods. The RGT, a qualitative method that originated from the field of clinical psychology, was used. The RGT was selected over other common methods in social research because of its ability to elicit unarticulated or implicit constructs of individuals in a less structured way. Telephone survey was also used to administer the questionnaire, which was designed based on the results of the qualitative RGT interviews and previous validated scales. Furthermore, the statistical techniques used to analyze the data collected by telephone survey were discussed. Generally, statistical analyses were conducted to test the representativeness of the sample compared

with the population profile, to group the salient attributes of UGS, to test the significance of hypothesized relationships in the research models, and to investigate the effects of demographic variables and CMV.

Chapter 4 A Conceptual Model of UGS Usage

4.1 Introduction

Miles and Huberman (1994) defined conceptual model as one that "explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables and the presumed relationships among them" (p. 18). Therefore, conceptual model is a collection of concepts that both articulate and supporting each other (Jabareen, 2009). Maxwell (2012) proposed a broader perspective of conceptual model, which refers to the beliefs that a researcher holds about the study; this term can thus be used interchangeably with "theoretical framework" and "idea context." Jabareen (2009) proposed that a conceptual model aims to obtain an understanding of a phenomenon which do not emphasize on variable or factors and their relationships. A conceptual model can be developed through a process of review on multidisciplinary literature. In this section, a conceptual model of UGS usage is developed based on the three theoretical perspectives discussed in the following sections.

4.2 The Urban Planning Perspective

Hall and Tewdwr-Jones (2010) defined planning as activities involving "an orderly sequence of action that will lead to achievement of stated goals" (p. 3); they also stated that urban planning involves spatial, economic, and social

components. Campbell (1996) proposed that the top three priorities of urban planning include economic development, environmental production, and social justice. Therefore, urban planning guides the design of the urban environment and ensures orderly settlements with the preservation of the environment. Crane and Weber (2012) summarized the goals of urban planning by including beauty (aesthetic and visual pleasure), sustainability (development without compromising the needs of future generation), justice (fair distribution of resources), access (reach from a certain location), preservation (preservation of historical and cultural heritage), cultural diversity (accommodating different cultural and social needs), and resilience (capacity to change or adapt to change).

The association between urban environment and human behaviours has been one of the major research areas in urban planning, particularly in the subfield of urban design (Handy, Boarnet, Ewing, & Killingsworth, 2002). Urban design literature, such as Lynch (1984) and Whyte (2001), indicated that people prefer to use urban spaces when it is well designed. For example, a number of prior studies investigated the relationship between urban design and physical activities of people (Badland, Schofield, & Garrett, 2008; Ewing & Handy, 2009; Handy, 1996; Saelens, Sallis, Black, & Chen, 2003). As described in detail in Chapter 2, accessibility, size, facilities, naturalness, and safety are the key attributes of UGS identified by previous studies (Carr, 1992; Giles-Corti et al., 2005; Grahn, 1994; Kaczynski et al., 2008; Lee & Maheswaran, 2011; Lee & Moudon, 2008; Van Herzele & Wiedemann, 2003). These studies generally proposed the direct relationship between UGS attributes and their use (Figure 4.1). Therefore, if a

UGS possesses attributes that can satisfy people, such as being open and accessible to the public, well equipped and well maintained, then these can lead to increased frequency of use (Bonnes et al., 2011; Burgess et al., 1988).

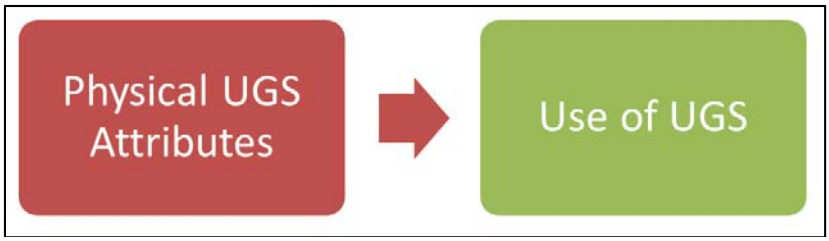

Figure 4.1 The urban planning perspective on the use of UGS
(Source: Whyte (2001); Van Herzele and Wiedemann (2003))

Nevertheless, Ewing and Handy (2009) argued that physical features do not consider the individual perceptual process of the environment. By applying the concept of environmental psychology, they proposed that the physical features of an environment should influence the perception of an individual of the environment and, subsequently, their behaviour. Heath et al. (2006) also stated the importance of perceived environment, in addition to the physical features of an environment, in understanding the behaviours of people. Therefore, considerable research efforts in urban design have integrated the social and psychological concepts to better understand and explain human behaviours. In the subsequent sections, two social and psychological perspectives in understanding the use of UGS would be discussed.

4.3 The Socio-ecological Perspective

The notion of socio-ecological perspective indicated that human beings, similar to animals and plants, live in an environment and that their behaviours are influenced by the environment. Therefore, understanding the environment where individuals live in can help us understand their behaviours (Bronfenbrenner, 1977; Schipperijn, Ekholm, et al., 2010). This perspective on human behaviours assumes the existence of interactions between individuals and social and physical environments (Giles-Corti & Donovan, 2002; Sallis et al., 2006). This perspective indicates that the behaviours of individuals are influenced by individual, social, and environmental factors. Within this context, the levels of influence can be categorized in numerous ways. For example, Bronfenbrenner (1977) used the microenvironment, mesoenvironment, and exoenvironment to describe individual, interpersonal, and social influences, respectively. By contrast, Sallis et al. (2006) proposed intrapersonal, interpersonal, community, and policy environments. Applying this perspective, Schipperijn, Stigsdotter, et al. (2010) reported that the use of UGS is influenced by individual factors (e.g., demographic background), social influence, and environmental factors (e.g., physical, cultural, and policy environments).

Figure 4.2 shows the socio-ecological perspective in understanding individual behaviours towards the use of UGSs. The most inner level involves the intrapersonal factors of an individual, including demographic background, and

psychological factors towards the use of UGSs. The second level involves the interpersonal factors, which refer to the behaviour of an individual that is influenced by other individuals, such as his/her family and friends. The third level involves the perceived environment, which refers to how individuals perceived a physical environment. For example, the presence of lighting (physical environment) may lead to the feeling of a safe environment (perceived environment). The fourth level involves the physical environment that includes the physical features of a particular setting, for example, size and facilities. Finally, the fifth level involves the policy environment that refers to related policies and regulations, for example, the planning guidelines for the UGSs.

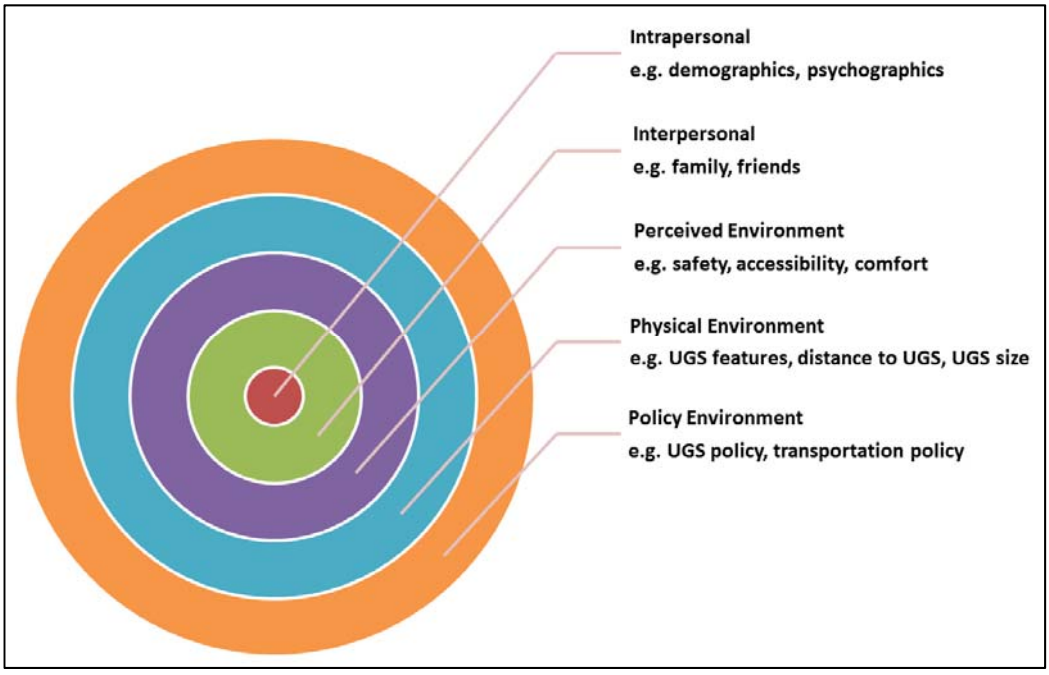

Figure 4.2 The socio-ecological perspective on the use of UGSs
(Source: Sallis et al. (2006); Schipperijn, Stigsdotter, et al. (2010))

The socio-ecological perspective on human behaviours provides a hierarchical understanding of how individual behaviours are formed or influenced by varying

levels of factors and environments (Giles-Corti, 2006; Giles-Corti & Donovan, 2002; Raymore, 2002; Sallis, Owen, & Fisher, 2008). In addition to understanding behaviours, the socio-ecological perspective also assists policymakers in designing intervention to encourage desired behaviours or discourage unwanted ones. Sallis et al. (2008) stated that interventions can be designed with different levels as well as more comprehensive and effective programs to encourage behavioural change. For example, public authorities can provide counselling at the individual level and a smoke-free environment at the policy level to encourage people to quit smoking.

4.4 The Socio-psychological Perspective

Social psychology is a subfield of psychology that focuses on the psychological feelings and behaviours of people in the presence of others (Lindzey, Gilbert, & Fiske, 1998). The socio-psychological perspective explains that human behaviours are the results of psychological states and social situations, and are commonly influenced by both intrapersonal (e.g., attitude) and interpersonal components (e.g., social influence) (Sewell, 1989). Therefore, this perspective bridges the gap between sociology and psychology, either of which focuses on the social and individual levels, respectively.

Bamberg and Schmidt (2003) explained that the socio-psychological theories and models have their own assumptions. Four socio-psychological theories were selected and discussed in Chapter 2. These models share one similarity in

assuming that behaviours are explained by intrapersonal and interpersonal influences; for instance, TPB includes attitude as an intrapersonal component and subjective norm as an interpersonal component. However, each of these models have their own emphases. TPB assumes individuals are utility maximizing; NAM explains behaviours based on moral consideration; TIP focuses on habitual influences; and HBM focuses on health considerations. Although these models may explain behaviours controversially, common factors are identified based on the four theories, including attitudes, perceived consequences, subjective norm, and PBC. As explained in Section 2.5.5, habit and moral norm are concepts that are not suited in examining UGSs because of the problematic measurement of habit and irrelevance of moral norm, respectively (Conner & Armitage, 1998; De Bruijn et al., 2007). Figure 4.3 shows the socio-psychological perspective on the use of UGSs.

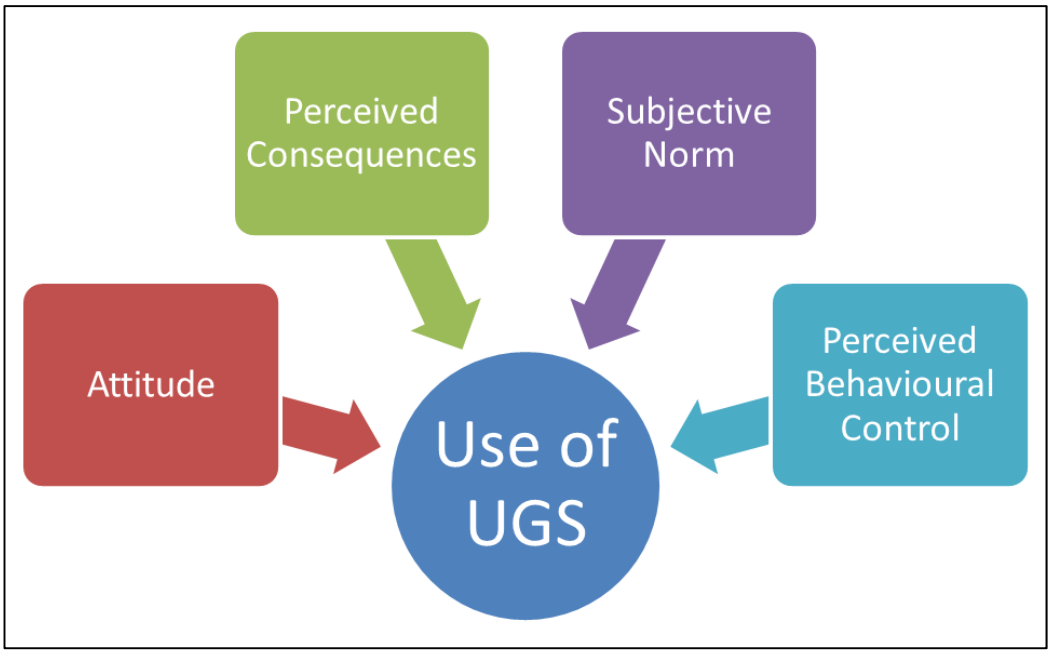

Figure 4.3 The socio-psychological perspective on the use of UGSs
(Source: Ajzen (1991); Schwartz (1977); Wang et al. (2015))

4.5 Overview of the Conceptual Model

By integrating the three perspectives discussed previously and the hypotheses developed in Chapter 3, a conceptual model is developed (Figure 4.4), which is then used to guide the study on the use of UGSs. The model consists of five components, namely, UGS attributes, attitude, perceived consequences, social influence, and PBC.

In the conceptual model, UGS attributes influence the psychological factors including attitude, perceived consequences and perceived behavioural control of the UGS users. Together with the social influence, these socio-psychological factors influence the UGS usage of people. Furthermore, based on the proposed hypotheses described in Chapter 3, social influence does not only directly influence UGS usage, but also moderates the impact of the psychological factors on UGS usage.

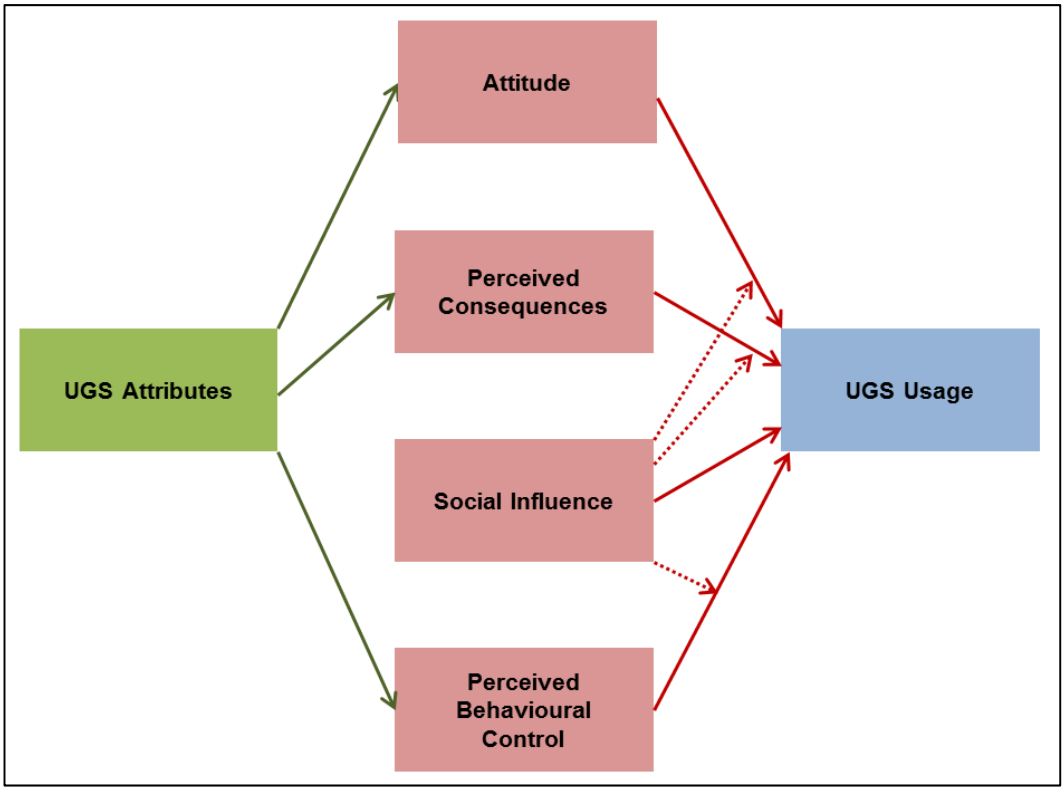

Figure 4.4 The conceptual model of UGS usage

4.5.1 UGS Attributes

UGS attributes can refer to either the physical attributes or perceived attributes of UGSs. In this study, perceived attributes are measured because previous studies have demonstrated that self-reported environmental perception is a better predictor of behaviours compared with objectively measured factors (Millington et al., 2009; Scott et al., 2007). In addition, Ewing and Handy (2009) and Heath et al. (2006) argued that physical features influence behaviours via perception of the environment. Therefore, perceived UGS attributes are considered a key component of the conceptual model to be applied in examining the use of UGSs.

4.5.2 Attitude

As an essential concept in social psychology, attitude is an expression of whether a person favors (likes) or disfavors (dislikes) an object (Lindzey et al., 1998). The attitude objective can be a person, a physical objective, a place, or a behaviour. Fishbein and Ajzen (1975) proposed an attitude-behaviour relationship, which predicts that if an individual favors a behaviour, then he/she will perform the behaviour. Burton (2004) indicated that the TRA (Fishbein, 1979) is a pioneering model that reliably demonstrates the relationship between attitude and behaviour. The attitudes and behaviours of people are usually consistent with each other (Ajzen & Fishbein, 1977).

4.5.3 Perceived Consequences

TPB assumes that individuals are utility maximizing; therefore, individuals would act for the most positive behavioural consequences (Ajzen, 1991). Similarly, the NAM proposed that awareness of consequences activates the performance of behaviours (Schwartz, 1977). Therefore, in the context of UGSs, the positive consequence of using them is an important component of UGS usage. Generally, UGSs are perceived by users as being capable of bringing multiple benefits, for example, provision of recreation opportunities, microclimatic regulation, and improvement of environmental quality (Jim & Chen, 2006;

Tyrväinen, 2001). Lafortezza et al. (2009) proposed and revealed the association between perceived benefits and frequency of using UGSs.

4.5.4 Social Influence

Social influence or subjective norm is the perceived social influence of other important or close individuals or groups on an individual (e.g., friends and peers) (Fishbein & Ajzen, 1975). Social cognitive theory (Bandura, 1989) posits that the behaviour of an individual is influenced by his/her own observation of the behaviours of others within a particular setting. Cialdini, Kallgren, and Reno (1991) further investigated the social influence that can be categorized into two types, namely, injunctive and descriptive norms. Injunctive norms refer to the behaviour commonly approved or disapproved, which is equivalent to the subjective norm in TPB (Heath & Gifford, 2002), while descriptive norms refer to the behaviours shown by most of the members in a particular social setting. Schultz, Nolan, Cialdini, Goldstein, and Griskevicius (2007) reported that the strength of the influence of each type of social norm depends on specific contexts and individuals.

4.5.5 Perceived Behavioural Control

PBC refers to the perception of an individual with regards the ease or difficulty of performing the behaviour of interest (Ajzen, 1991). Trafimow, Sheeran, Conner, and Finlay (2002) investigated the concept of PBC, which proposes two

dimensions of the construct, namely, perceived control and perceived difficulty. Perceived control refers to whether the extent to which an individual considers performing a behaviour is under their volition control, whereas perceived difficulty refers to the level of ease or difficulty of an individual to perform a behaviour. Similarly, Do Valle et al. (2005) proposed two key dimensions of PBC, namely, external conditions (facilitators or constraints) and perceived ability of an individual (knowledge and skills). Therefore, PBC covers the external conditions and internal ability of performing a behaviour. These two dimensions can be interrelated to each other. For example, the distance to a UGS can be an external condition; however, an individual may perceive a high level of difficulty in accessing that UGS by walking, whereas another individual may perceive a low level of difficulty in accessing it by driving.

4.6 Chapter Summary

This chapter discusses three perspectives in understanding individual use of UGS. First, the urban planning perspective emphasizes the design of the UGS and its direct relationship with user behaviour. Second, the socio-ecological perspective indicates that individuals are influenced by a hierarchy of influences ranging from individual to large environmental levels. Third, the socio-psychological perspective discusses the influences of social and psychological factors and considers the influences of other factors in the society and the innate psychological influences of users. These perspectives are not contradictory, but instead, they rather complement one another. By integrating these perspectives,

five major components related to the use of UGS are identified, including UGS attributes, attitude, perceived consequences, social influence, and PBC. Based on these components, a conceptual model is developed.

Chapter 5 Data Analysis and Findings

5.1 Response Rate and Respondent Profile

Following the RGT triad card method, 131 constructs were elicited from 21 respondents. The RGT sample consisted of 9 males and 12 females, 15 of whom were younger than 30 years, and 6 of whom were 30 years or older. In the data reduction process, the two raters reached consensus on 21 resultant constructs by eliminating ambiguous constructs and consolidating similar or repeated constructs. The inter-rater reliability was 91.6%. The educational levels of respondents ranged from secondary to bachelor's degree levels.

The administered questionnaire consisted of statements of the 21 constructs elicited from the RGT interviews, items that measured the attitudinal and TPB variables, and demographic background questions. Overall, 263 valid responses were collected from the telephone survey (Table 5.1).

The sample size of 263 indicated the fulfillment of the sample size requirement suggested by Hair et al. (2011), i.e. 10 x the largest number of hypothesised relationships (i.e. 9) directed to the dependent variable, behavioural intention (i.e. 90). This also fulfilled the required sample size of 166 based on statistical power analysis (Akter et al., 2011; Faul et al., 2007) ($\alpha = 0.05$; $f^2 = 0.15$; $n_p = 7$). Therefore, the sample size of 263 in this study is adequate for PLS analysis.

Table 5.1 Response rate of the telephone survey

Dialing outcomes (dispositions)	**Number of calls**
Refusal	14
Partial completion	33
Successful completion	263
Out of scope[1]	3,928
Total no. of calls made	**4,238**

[1]Including fax machine, uncontactable numbers, business numbers, communication problems, and ineligible households (i.e., no adults).

The response rate was 84.8% based on the following formula (Groves et al., 2001; Massey, O'Connor, & Krotki, 1997):

$$Response\ Rate\ = \frac{Successful\ Completion}{Total\ No.\ of\ Calls - Out\ of\ Scope}$$

The descriptive statistics of the sample and the corresponding population profile (Census and Statistics Department, 2011) are presented in Table 5.2. Chi-square tests were conducted to determine whether significant differences existed between the composition of the sample and the composition of the population. The results revealed no significant differences between the sample and the population in terms of gender, age, monthly income, and type of housing ($p > 0.05$). However, the education levels of the sample deviated from the census data ($p < 0.05$). Based on the percentage difference between the sample and the

population profile, the group with low educational level, i.e., primary or below, was underrepresented.

Table 5.2 Respondent profile of the telephone survey

Demographic variable	Sample (*N*)	Sample (%)	Population (%)	Difference[a] (%)
Gender ($\chi^2 = 0.73$; p = 0.39)				
Male	108	41.06	46.71	-5.64
Female	155	58.94	53.29	5.64
Age ($\chi^2 = 0.27$; p = 0.75)				
18 to 24	36	13.69	10.45	3.24
25 to 34	42	15.97	18.07	-2.10
35 to 44	48	18.25	18.92	-0.67
45 to 54	62	23.57	21.49	2.08
55 to 64	48	18.25	15.38	2.87
≥65	27	10.27	15.69	-5.42
Educational level ($\chi^2 = 21.51$; p = 0.00)				
Primary	30	11.41	37.60	-26.19
Secondary	128	48.67	41.38	7.29
Postsecondary	105	39.92	21.02	18.90
Personal monthly income (HKD) ($\chi^2 = 0.16$; p = 0.81)				
<10K	119	45.25	39.98	5.27
10K to 20K	65	24.71	32.87	-8.15
20K to 30K	30	11.41	12.01	-0.60
30K to 40K	16	6.08	6.10	-0.01
>40K	28	10.65	9.05	1.60
Refused to answer	5	1.90		
Type of housing ($\chi^2 = 0.02$; p = 0.89)				
Public	124	47.15	46.38	0.77
Private	139	52.85	53.62	-0.77

[a] Difference was calculated by subtracting census percent from survey percent.

5.2 Identification of UGS Attributes

The results of the factor analysis grouped the 21 constructs from the RGT into four factors (Table 5.3) that could be retained for further analysis. The KMO was 0.941 and the p-value of Bartlett's test of sphericity was 0.000. Thus, the data were suitable for factor analysis. Cronbach's alpha values for all four factors were greater than 0.70, indicating acceptable reliability of the items grouped into the variables (Hair, Black, et al., 2013). Variables are considered "highly loaded" and salient to the interpretation of a factor when the loadings are greater than 0.4 (Field et al., 2012) (figures rendered in bold in Table 5.3). Using this criterion, the variables are grouped together in the appropriate factor categories.

Table 5.3 Rotated factor matrix

		Factor			
		1	**2**	**3**	**4**
	Eigenvalues	10.24	1.56	1.23	1.02
	% of variance	48.76	7.45	5.86	4.86
	Cumulative %	48.76	56.21	62.07	66.93
Variable	Cronbach's alpha	0.94	0.83	0.76	0.77
Nice themed design		**0.790**	0.199	0.149	0.258
Sufficient catering services		**0.771**	0.179	-0.029	0.245
Educational features (e.g., tree labels, exhibition gallery)		**0.747**	0.233	0.175	0.139
Aesthetic features (e.g., sculpture)		**0.726**	0.306	0.051	0.171
Various events (e.g., flower show, Lunar New Year fairs)		**0.689**	0.187	0.228	0.160
Good facilities management		**0.674**	0.400	0.153	0.217
Sufficient seating		**0.662**	0.246	0.345	0.085
Facilities for specific interests		**0.643**	0.320	0.307	0.249
Accessible through public transportation		**0.630**	0.129	0.456	0.122
Barrier-free facilities for elderly/disabled persons		**0.619**	0.219	0.365	0.256

Beautiful scenic view	**0.597**	0.529	0.135	0.129
Sufficient spaces (not crowded)	0.221	**0.776**	0.239	0.112
Clear zoning for various activities	0.226	**0.728**	0.225	0.159
Natural environment	0.464	**0.656**	0.044	0.148
Good air quality	0.331	**0.609**	0.198	0.259
Convenient opening hours	0.235	0.079	**0.859**	0.080
Free of charge facilities	0.242	0.157	**0.749**	0.001
Conveniently located (e.g., close to home)	0.028	0.296	**0.664**	0.219
Facilities for all weather conditions	0.259	0.073	0.081	**0.836**
Wide range of facilities	0.253	0.293	0.197	**0.755**
Sufficient ancillary facilities (e.g., drinking and washroom)	0.367	0.404	0.062	**0.540**

Note: The figures rendered in bold denote the highest factor loadings of the variables.

The items that loaded highly on the first factor are about aspects of the design, facilities, and management of the UGS. This factor is termed “Features,” which are defined in this study as the evaluation of a user on how well the UGSs are provisioned and managed.

The second factor included items, such as sufficient space, natural environment, and air quality. This factor is termed “Naturalness” and signifies the extent of the beliefs of respondents of the extent to which the UGSs they visited are natural settings with vegetation and other natural elements.

The third factor, “Accessibility,” consists of items regarding hours of operation, location (access), and fees to use UGSs. Conceptually, accessibility refers to the extent to which the respondents perceive the use of UGS as personally convenient, appropriately located for their personal use, accessible, and reasonably priced.

The fourth factor, “Variety of facilities,” is termed as such because its items are about the range of facilities, facilities designed for various weather conditions, and ancillary facilities. This factor refers to the extent to which a respondent believes that UGSs provide different types of facilities for different purposes that can be used under different weather conditions.

Figure 5.1 shows the mean values of the 21 indicators rated by the respondents. As can be seen, “Free of charge facilities” and “Convenient opening hours” were

rated the highest, 5.59 and 5.19 out of 7, respectively. “Sufficient catering services,” “Esthetic features,” and “Themed design” were rated the lowest (below 4 out of 7). These results indicated that the respondents were unsatisfied with these aspects found in UGSs that they visited.

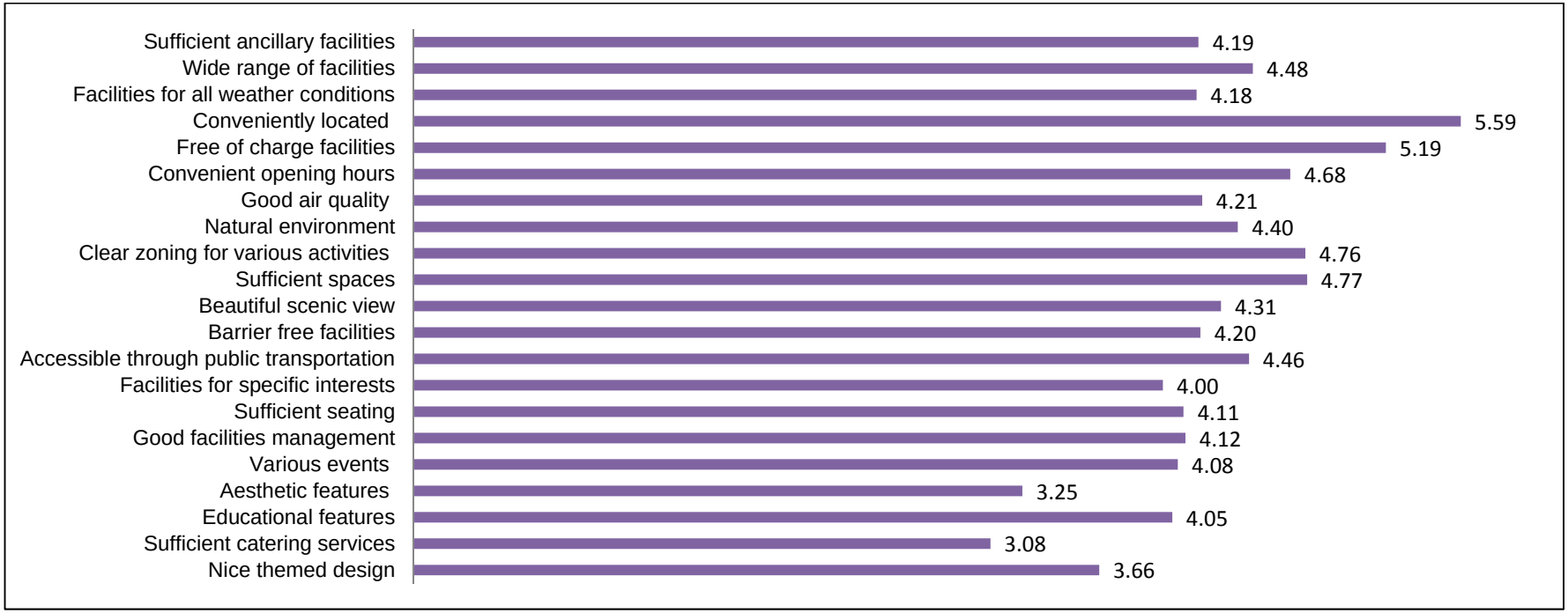

Figure 5.1 The satisfaction levels of the 21 UGS attributes

5.3 Evaluation of the PLS Measurement Model

Before examining the relationships between the constructs, the PLS measurement model was evaluated by examining the convergent and discriminant validities of the indicators, along with their composite reliability.

All the standard factor loading values of the measurement model exceeded 0.5 and were significant at $p = 0.01$. The composite reliabilities of the constructs ranged from 0.862 to 0.954, and the AVE ranged from 0.564 to 0.873. Therefore, all of the aforementioned criteria for convergent validity were met. Cronbach's alpha scores ranged from 0.760 to 0.940 (Table 5.4), indicating that each construct exhibited strong internal reliability based on the generally acceptable low limit (0.7) (Hair, Black, et al., 2013).

Table 5.4 The measurement model

Constructs	Factor loadings	Average variance extracted	Composite reliability	Cronbach's alpha (α)
Features (FEA)	0.854	0.625	0.948	0.940
	0.763			
	0.814			
	0.786			
	0.770			
	0.818			
	0.771			
	0.822			
	0.742			
	0.771			
	0.777			
Naturalness (NAT)	0.812	0.655	0.883	0.827
	0.804			
	0.774			
	0.845			
Accessibility (ACC)	0.854	0.678	0.862	0.760
	0.879			
	0.729			
Variety of facilities (FAC)	0.810	0.685	0.867	0.771
	0.855			
	0.817			
Usefulness (USE)	0.890	0.726	0.913	0.873
	0.898			
	0.874			
	0.738			

Perceived quality (PQ)	0.729 0.837 0.834 0.868 0.636	0.617	0.888	0.842
Attitude (ATT)	0.852 0.876 0.906 0.889 0.799	0.749	0.937	0.916
Subjective norm (SN)	0.697 0.932 0.939 0.920	0.771	0.930	0.896
Perceived behavioural control (PBC)	0.792 0.762 0.822 0.739 0.693 0.687	0.564	0.885	0.849
Behavioural intention (BI)	0.869 0.898 0.896	0.788	0.918	0.865
Behaviour (BEH)	0.918 0.939 0.947	0.873	0.954	0.927

Note: Appendices 1 and 2 show the corresponding questionnaire statements of the aforementioned indicators.

Furthermore, all constructs met the requirement for assessing discriminant validity, which requires that the square root of the AVE should be greater than

the correlations between the construct and any other construct in the model (Chin, 1998b; Fornell & Larcker, 1981) (Table 5.5).

Table 5.5 Correlations among constructs

	FEA	NAT	ACC	FAC	USE	PQ	ATT	SN	PBC	BI	BEH
FEA	**0.790**										
NAT	0.722	**0.809**									
ACC	0.524	0.470	**0.823**								
FAC	0.650	0.603	0.359	**0.828**							
USE	0.682	0.573	0.557	0.536	**0.852**						
PQ	0.702	0.599	0.573	0.549	0.596	**0.785**					
ATT	0.430	0.382	0.450	0.316	0.609	0.422	**0.865**				
SN	0.440	0.349	0.313	0.338	0.530	0.428	0.574	**0.878**			
PBC	0.498	0.484	0.607	0.399	0.545	0.596	0.467	0.508	**0.751**		
BI	0.334	0.297	0.321	0.322	0.552	0.384	0.505	0.547	0.538	**0.888**	
BEH	0.232	0.185	0.220	0.191	0.399	0.232	0.308	0.399	0.421	0.738	**0.935**

Note: Figures rendered in bold are the square roots of the average variance explained (AVE).
FEA = features; NAT = naturalness; ACC = accessibility; FAC = variety of facilities; USE = usefulness; PQ = perceived quality; ATT = attitude; SN = subjective norm; PBC = perceived behavioural control; BI = behavioural intention; BEH = behaviour

5.4 Salience of the UGS Attributes

PLS path analysis, with attitude, usefulness, perceived quality, and behavioural intention as the dependent variables, was used to determine which of the four factors identified in the factor analysis exerted influence on these dependent variables. The results, which are obtained via bootstrap resampling routine with 263 cases and 1000 samples, are presented in Table 5.6.

Table 5.6 PLS path analysis-the influence of attributes on usefulness, perceived quality, and behavioural intention

	Attitude			**Usefulness**			**Perceived quality**			**Behavioural intention**		
	β	*t*	Sig.	β	*t*	Sig.	β	*t*	Sig.	β	*t*	Sig.
Features	0.200	2.345	**	0.407	5.418	***	0.398	6.101	***	0.103	1.300	
Naturalness	0.071	1.114		0.074	1.265		0.115	2.029	*	0.040	0.689	
Accessibility	0.304	4.695	***	0.264	5.421	***	0.269	5.844	***	0.194	3.114	***
Variety of facilities	0.039	0.725		0.130	2.196	*	0.124	2.294	*	0.170	2.094	*
R^2		0.266			0.539			0.573			0.167	

Note: *p < 0.05, **p < 0.01, ***p < 0.001

The four factors identified from the repertory grid interviews accounted for 26.6%, 53.9%, 57.3%, and 16.7% of the variances in attitude, usefulness, perceived quality and behavioural intention, respectively. As can be seen, features and accessibility were significantly correlated with attitude. Except for the path from naturalness to usefulness, all other factors were found to be significant predictors of the other two attitudinal measures, i.e., usefulness and perceived quality. The four factors explained a weak amount of variance of attitude. The four factors explained a moderate amount of variance of usefulness and perceived quality. These findings indicated that, if an individual perceives the UGS as providing better features, naturalness, accessibility and variety of facilities, then a higher level of usefulness and perceived quality is obtained from it. However, naturalness did not exert an influence on the level of usefulness from the users' perspective.

Meanwhile, accessibility and variety of facilities were found to be significant predictors of behavioural intentions, but features and naturalness were not. This finding indicated that the intention of an individual to visit the UGS is influenced by how accessible the UGS is and the level at which it can provide an extensive range of facilities. It is noteworthy that the variance explained by behavioural intention is comparatively low. According to the interpretation of Hair et al. (2011), the variance is below the weak level (i.e., 0.25).

Tenenhaus et al. (2005) proposed that the R^2 value can be divided in terms of the path coefficients and correlations between the dependent and explanatory variables. Table 5.7 shows the contribution of each of the four explanatory factors to predictions related to the dependent variables.

Table 5.7 Explanation of variance (R^2) of attitude, usefulness, perceived quality, and behavioural intention

	Contribution to the explanation of variance (R^2)			
	Attitude	Usefulness	Perceived quality	Behavioural intention
Features	32.83%	51.69%	48.79%	21.23%
Naturalness	10.34%	7.90%	12.20%	7.29%
Accessibility	52.13%	27.41%	27.10%	37.94%
Variety of facilities	4.70%	13.00%	11.90%	33.54%

Features and accessibility were the most important predictors of attitude that contributed approximately 33% and 52%, respectively, of variance explained. Similarly, features and accessibility were found to be the most important variables in the prediction of usefulness and perceived quality. Features contributed approximately 50%, whereas accessibility contributed approximately 27% to the explanation of variance in these two dependent variables. Accessibility showed a more important role in the prediction of behavioural intention, contributing 37.9% to R^2, while the contribution of variety of facilities to R^2 was 33.5%. Among all four factors, features and accessibility contributed

the most, whereas naturalness contributed the least to the prediction of the four dependent variables.

5.5 The Moderating Effects of Subjective Norm

Bootstrap resampling routine with 263 cases and 1,000 samples was used to examine the path significance of the proposed research framework, as shown in Figure 3.1. The analysis was divided into three steps: (i) a PLS model with TPB components (i.e., H_{B1} to H_{B4}); (ii) two additional attitudinal measures (usefulness and perceived quality) were added to the model (i.e., H_{B5} to H_{B6}); and (iii) the moderating effect of subjective norm were added to the model (i.e., H_{B7} to H_{B10}), with the aim of investigating the effect of the proposed addition of variables and the moderating effect of subjective norm. Table 5.8 lists the results of the analysis.

Table 5.8 PLS path analysis-testing results of the TPB components, attitudinal factors, and moderating effects of subjective norm

Paths	**Model 1**			**Model 2**			**Model 3**		
	β	*t*-value	Sig.	β	*t*-value	Sig.	β	*t*-value	Sig.
H_{B1} ATT → BI	0.208	3.414	***	0.123	1.845	*	−0.029	0.229	
H_{B2} SN → BI	0.273	4.245	***	0.241	3.757	***	0.626	2.931	**
H_{B3} PBC → BI	0.299	4.725	***	0.270	3.784	***	0.110	0.662	
H_{B4} BI → BEH	0.742	22.805	***	0.740	22.468	***	0.738	21.898	***
H_{B5} USE → BI				0.252	3.476	***	0.602	2.763	**
H_{B6} PQ → BI				−0.084	1.458		0.300	1.680	*
H_{B7} ATT × SN → BI							0.275	0.990	
H_{B8} PBC × SN → BI							0.369	1.337	
H_{B9} USE × SN → BI							−0.653	1.961	*
H_{B10} PQ × SN → BI							−0.691	2.057	*
R^2 (BI)		0.414			0.445			0.478	
R^2 (BEH)		0.551			0.548			0.544	
f^2 (BI)					0.056			0.064	

Note: *p < 0.05, **p < 0.01, ***p < 0.001
ATT = attitude; SN = subjective norm; PBC = perceived behavioural control; BI = behavioural intention; BEH = behaviour; USE = usefulness; PQ = perceived quality

All three models show a generally moderate amount of variance. The R^2 values ranged from 0.414 to 0.478 in behavioural intention, which can be explained by the proposed predictors included. In addition, the R^2 value of 0.54 shows a moderate amount of variance in behaviour, which can be explained by behavioural intentions.

Model 1, which included the three variables in TPB, accounted for 41.4% of the variance in the main effects on intention to use UGS. Model 1 showed that behavioural intention can be explained by attitude, subjective norm, and PBC. Moreover, behaviour can be explained by behavioural intention.

Model 2 included two additional variables, namely, usefulness and perceived quality, which were adopted from prior studies on UGSs. By adding the two variables, Model 2 accounted for 44.5% of the variance in intention to use UGSs. Model 2 also revealed that, aside from the three TPB variables, usefulness was positively correlated with behavioural intention. In comparison, perceived quality was not statistically significant at p = 0.05. Cohen (1988) proposed that the effect of a latent predictor can be calculated using the following formula, which is based on the value of R^2 with the proposed predictor included and excluded from the model:

$$f^2 = \frac{R^2 \text{ included} - R^2 \text{ excluded}}{1 - R^2 \text{ included}}$$

.

The values 0.02, 0.15, and 0.35 could be interpreted as small, medium and large effects at the structural level, respectively. The value of effect (f^2) for the two additional paths in Model 2 was 0.056, which indicated a small effect. However, Limayem and Cheung (2011) argued that the small effect does not necessarily imply an unimportant effect. Thus, to further understand the influences of additional factors, and following the suggested approach of Tenenhaus et al. (2005), the contribution to R^2 value was divided in terms of multiple regression coefficients and the correlations between the dependent and explanatory variables. Table 5.9 shows the contribution of each explanatory variable to predictions regarding the dependent variables. For this model, PBC, usefulness, and subjective norm were the most important variables in the prediction of behavioural intention, each contributing approximately 30% to the R^2 value. In addition, attitude contributed 13.94% to the total R^2 value.

Table 5.9 Explanation of variance (R^2) of behavioural intentions by the TPB components "usefulness" and "perceived quality"

Factor	**Contribution to R^2**
Attitude	13.94%
Subjective norm	29.51%
Perceived behavioural control	32.54%
Usefulness	31.20%
Perceived quality	-7.18%

Model 3 accounted for 47.8% of variance in recycling intention after the moderation of the subjective norm was included. The value of effect (f^2) for the moderating links was 0.064, which represented a small effect (as shown in Table 5.8 and Figure 5.2). However, two significant moderating paths, namely, USE × SN and PQ × SN, indicated strong β values of -0.653 and -0.691, respectively. In Model 3, the intention to use UGS was predicted by subjective norm, usefulness and perceived quality, thus supporting H_{B2}, H_{B5}, and H_{B6}, respectively. However, the results showed that attitude and PBC were not statistically significant with regards intention to use UGS; thus, H_{B1} and H_{B3} were rejected.

Meanwhile, subjective norm had a negative moderating effect on the link between usefulness and behavioural intention, with a path coefficient of -0.653 and a *t*-value of 1.961. This finding implied that the effect of usefulness on behavioural intention would be weaker when an individual perceives a high level of social influence. In addition, the link between perceived quality and intention was negatively moderated by subjective norm, with a path coefficient of -0.691 and a *t*-value of 2.057. This finding implied that, when an individual perceives a high degree of subjective norm, the positive relationship between perceived quality and intention to use UGS would diminish. Using the criterion of GoF for PLS proposed by Tenenhaus et al. (2005), the GoF value of Model 3 was found to be 0.617, thus indicating a large fit (Latan & Ghozali, 2012) that is considered acceptable.

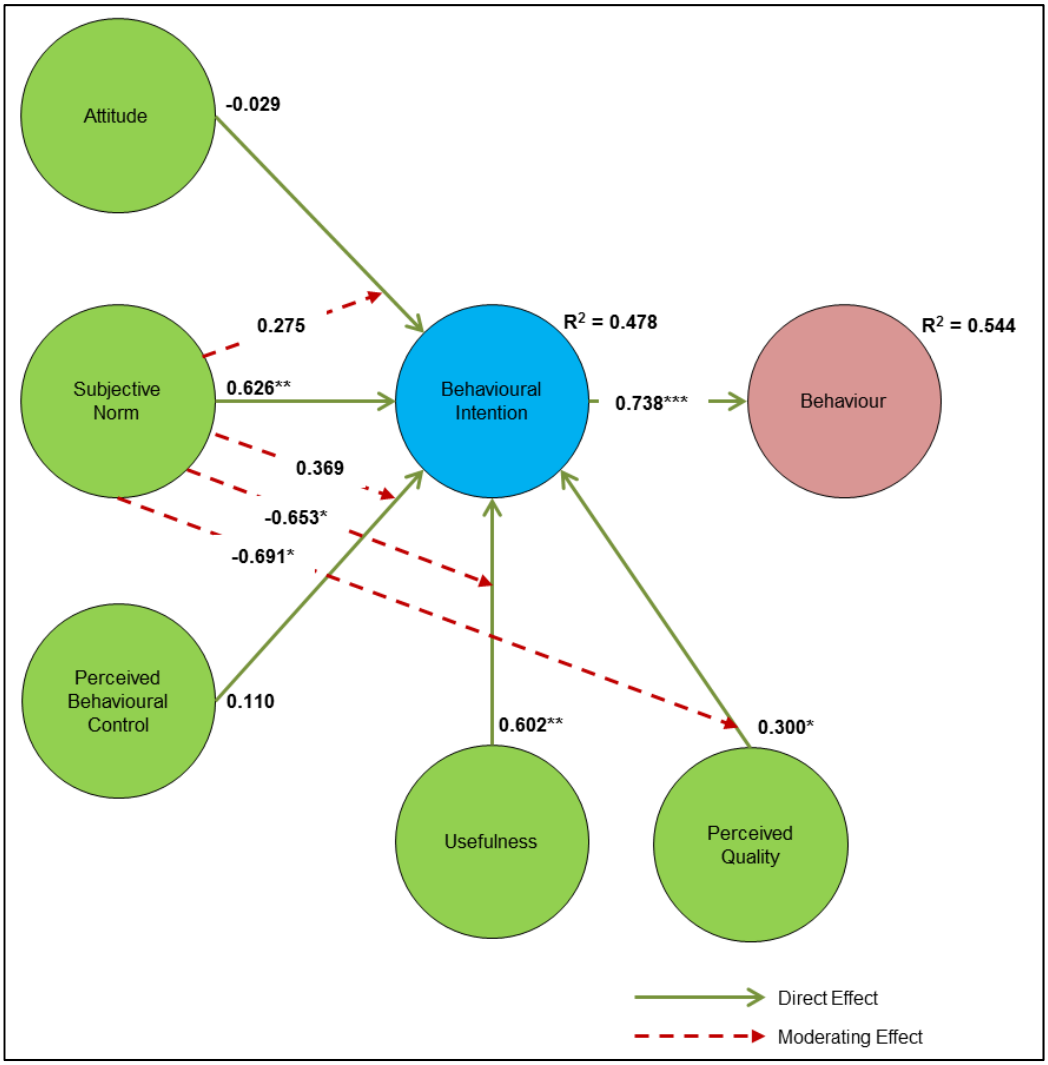

Figure 5.2 The moderating effects of subjective norms
(*p < 0.05, **p < 0.01, ***p < 0.001)

5.6 The Mediating Effects of Attitudes and PBC

According to Baron and Kenny (1986), testing of mediation includes four steps as listed below.

(i) The independent variable (e.g., *X*) should significantly predict the dependent variable (e.g., *Y*).

(ii) The independent variable should significantly predict the mediating variable (e.g., *M*).

(iii) The mediating variable should significantly predict the dependent variable, after controlling for the independent variable.

(iv) In estimating the mediating effect, a full mediation refers to the situation in which the mediating variable completely mediates the *X*-*Y* relationship. Hence, the effect of *X* on *Y* controlling for *M* should be zero. The effects in steps (iii) and (iv) are estimated using the same equation. However, partial mediation is established when the *X*-*Y* relationship remains significant, but is substantially reduced.

According to the results presented in Section 5.4, two out of the four attributes, i.e., accessibility and variety of facilities, elicited through the RGT were

significantly correlated with behavioural intention (Figure 5.3); thus, H_{C1} and H_{C2} were generally supported. These two UGS attributes were then used to test the mediating effects. The two nonsignificant UGS attributes were excluded according to step (i) used by Baron and Kenny (1986) to test the aforementioned mediating effects. The mediating roles of the three proposed mediating variables, i.e., attitude, PBC, and usefulness, were separately assessed.

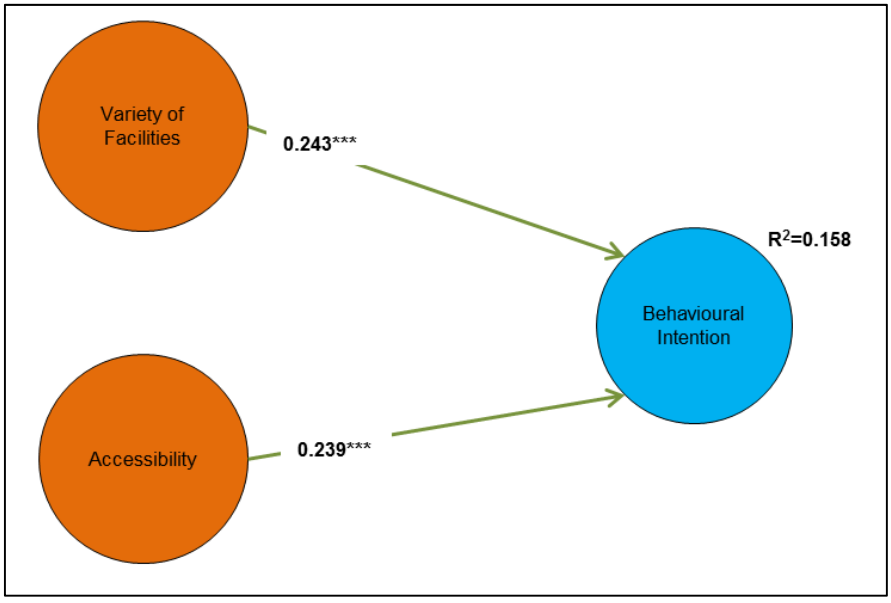

Figure 5.3 Direct effects of UGS attributes on behavioural intention
(*p < 0.05, **p < 0.01, ***p < 0.001)

Figure 5.4 shows the PLS path models, including the mediator, attitude (ATT). As can be seen, the path between variety of facilities (FAC) and behavioural intention (BI) remained significant (β = 0.179, t = 2.788, p < 0.01), but the relationship was weakened (i.e., β changed from 0.243 to 0.179). The path between accessibility (ACC) and behavioural intention (BI) became nonsignificant (β = 0.070, t = 1.361, p > 0.05). Considering the paths from the two attributes to attitude, i.e., FAC to ATT (β = 0.179, t = 2.788, p < 0.01) and

ACC to ATT ($\beta = 0.389$, $t = 6.856$, $p < 0.001$), ATT was found to be a significant predictor of behavioural intention ($\beta = 0.426$, $t = 7.075$, $p < 0.001$). These findings empirically proved that ATT partially mediated the path from FAC to BI and fully mediated the path from ACC to BI. Therefore H_{C3}, H_{C4}, and H_{C5} were all supported.

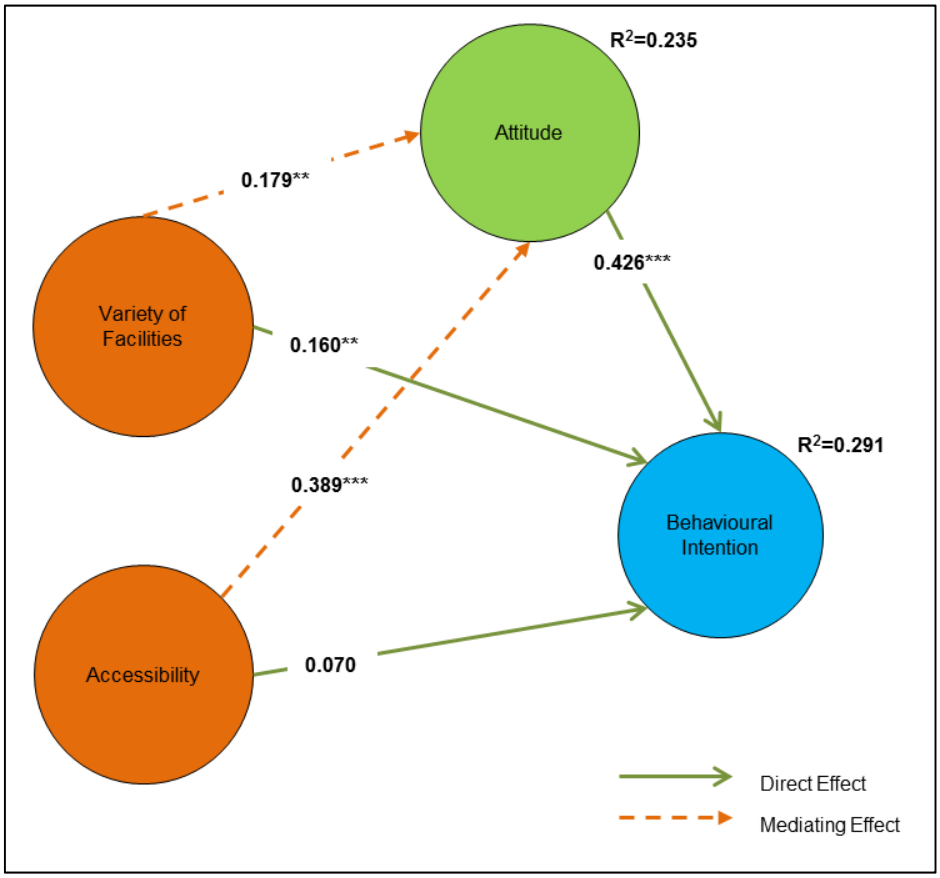

Figure 5.4 Mediating effects of attitude
(*p < 0.05, **p < 0.01, ***p < 0.001)

Figure 5.5 shows the assessment of the mediating role of PBC. Compared with the results shown in Figure 5.1, the path between accessibility (ACC) and behavioural intention (BI) became nonsignificant ($\beta = -0.027$, $t = 16.312$, $p < 0.001$) after the PBC was added. Given that the paths from ACC to PBC ($\beta =$

0.620, t = 0.609, p > 0.05) and PBC to BI (β = 0.484, t = 6.207, p < 0.001) were significant, it can be said that the PBC fully mediated the path from ACC to BI; thus, H_{C6} and H_{C7} were both supported.

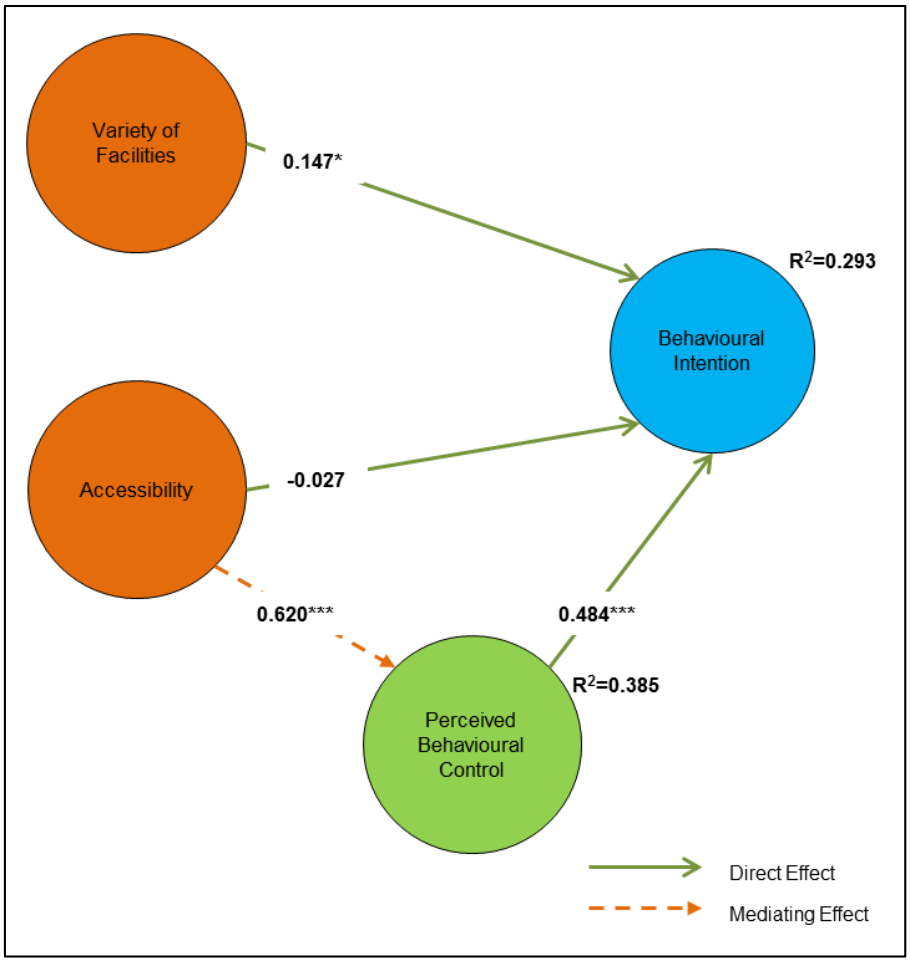

Figure 5.5 Mediating effects of PBC
(*p < 0.05, **p < 0.01, ***p < 0.001)

Figure 5.6 shows the assessment of the mediating effects of usefulness. As can be seen, the path from ATT to BI remained significant (β = 0.276, t = 3.684, p < 0.001) compared with that shown in Figure 5.4, but the path coefficient decreased from 0.348 to 0.276. The relationship between ATT and USE (β = 0.613, t = 14.329, p < 0.001) and that between USE and BI (β = 0.375, t = 4.063,

$p < 0.001$) were significant. These findings empirically proved that USE partially mediated the relationship between ATT and BI; thus, H_{C8} and H_{C9} were both supported.

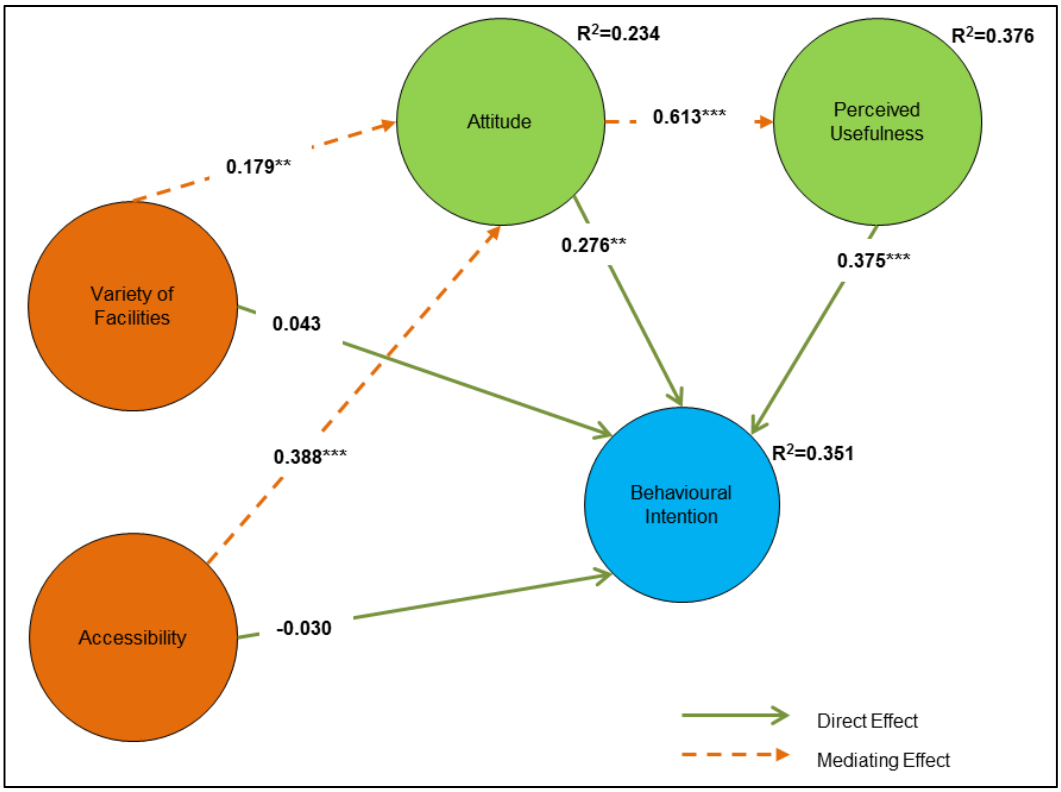

Figure 5.6 Mediating effects of perceived usefulness
(*p < 0.05, **p < 0.01, ***p < 0.001)

Finally, Figure 5.7 shows the PLS path analysis including all of the three proposed mediators. As can be seen, all of the proposed mediating effects, i.e., FAC to ATT ($\beta = 0.181$, $t = 2.964$, $p < 0.01$), ACC to ATT ($\beta = 0.386$, $t = 6.660$, $p < 0.001$), ACC to PBC ($\beta = 0.617$, $t = 15.201$, $p < 0.001$), and ATT to USE ($\beta = 0.613$, $t = 14.652$, $p < 0.001$), were significant. An unexpected result was observed in the model with a negative relationship between ACC and BI ($\beta = -0.183$, $t = 2.870$, $p < 0.01$). This result suggests that when an individual perceives

a high level of UGS accessibility, then he/she will have a lower intention to use the UGS. This relationship is theoretically illogical and inconsistent with the results shown in Figures 5.4 and 5.5. Therefore, the result may represent a statistical artifact when more paths were included in the PLS analysis.

In addition, the analysis showed that a moderate amount of variance in behavioural intention (R^2 = 0.423) can be explained by the proposed predictors and mediators included. The GoF value of this model was 0.497, indicating that the model had a medium fit and was, thus, deemed acceptable (Latan & Ghozali, 2012).

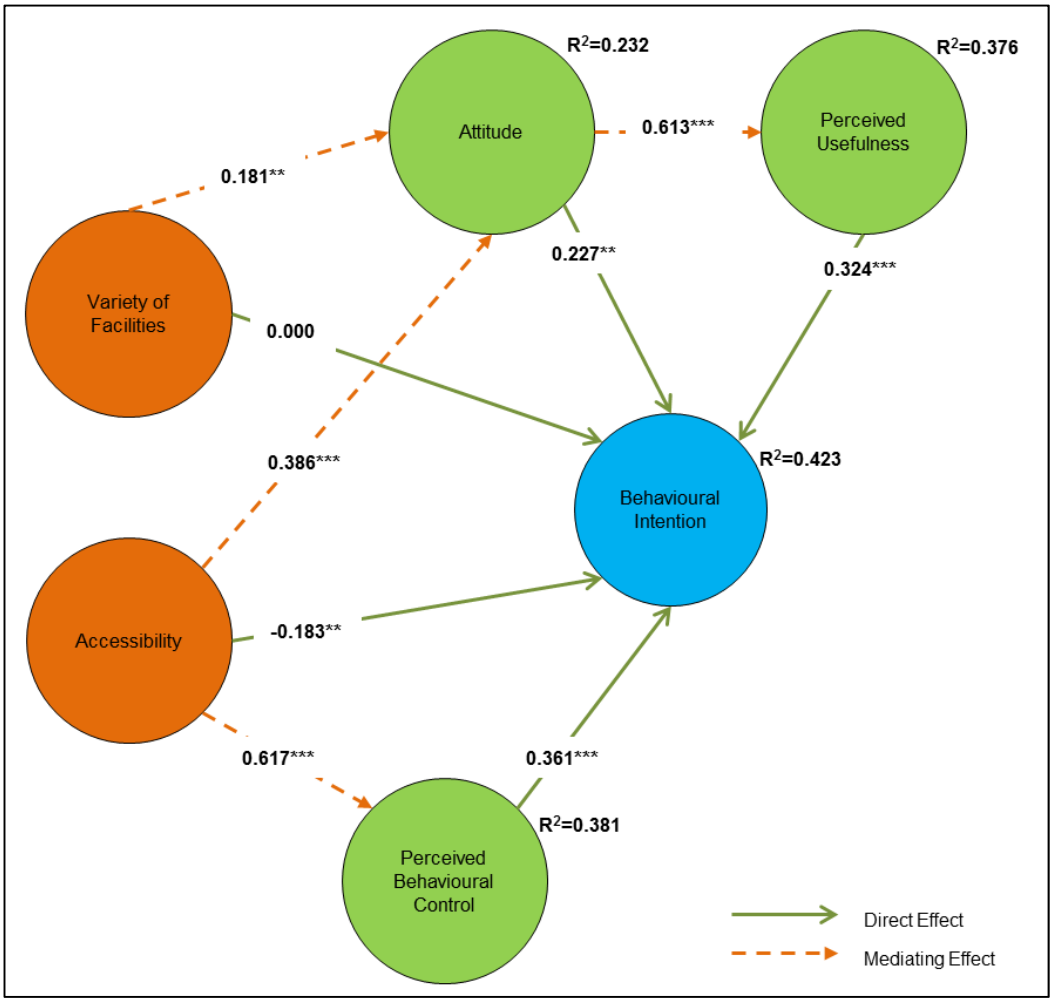

Figure 5.7 The full model of the mediating effects
(*p < 0.05, **p < 0.01, ***p < 0.001)

5.7 The Integrated Model of UGS Usage

PLS path analysis was conducted by including the four key UGS attributes and TPB factors. The analysis was carried out to obtain a more comprehensive understanding of the relationship between the UGS attributes and the factors included in TPB. The results, presented in Figure 5.8 and Table 5.10, were consistent with the results of the tests of the moderating and mediating effects discussed in the previous sections.

First, among the four attributes, features and accessibility significantly influenced attitude. By contrast, accessibility significantly correlated with PBC. Second, among the five socio-psychological factors, subjective norm, usefulness, and perceived quality were significantly related to behavioural intention to use UGS, whereas attitude and PBC were not. In addition, subjective norm negatively moderated two relationships, i.e., usefulness to behavioural intention and perceived quality to behavioural intention. In addition to the results discussed in Section 5.5, subjective norm also significantly moderated the relationship between PBC and behavioural intention. The main effect of PBC on behavioural intention was not significant. However, Baron and Kenny (1986) proposed that moderation exists when an interaction term of the independent and moderating variables is significant. Hence, the direct effect of the independent and moderating variables is irrelevant. The abovementioned finding implies that, if an individual perceived a high level of PBC, positive social influence would strengthen the effect of PBC on behavioural intention. Finally, the integrated model showed the significant relationship between behavioural intention and behaviour.

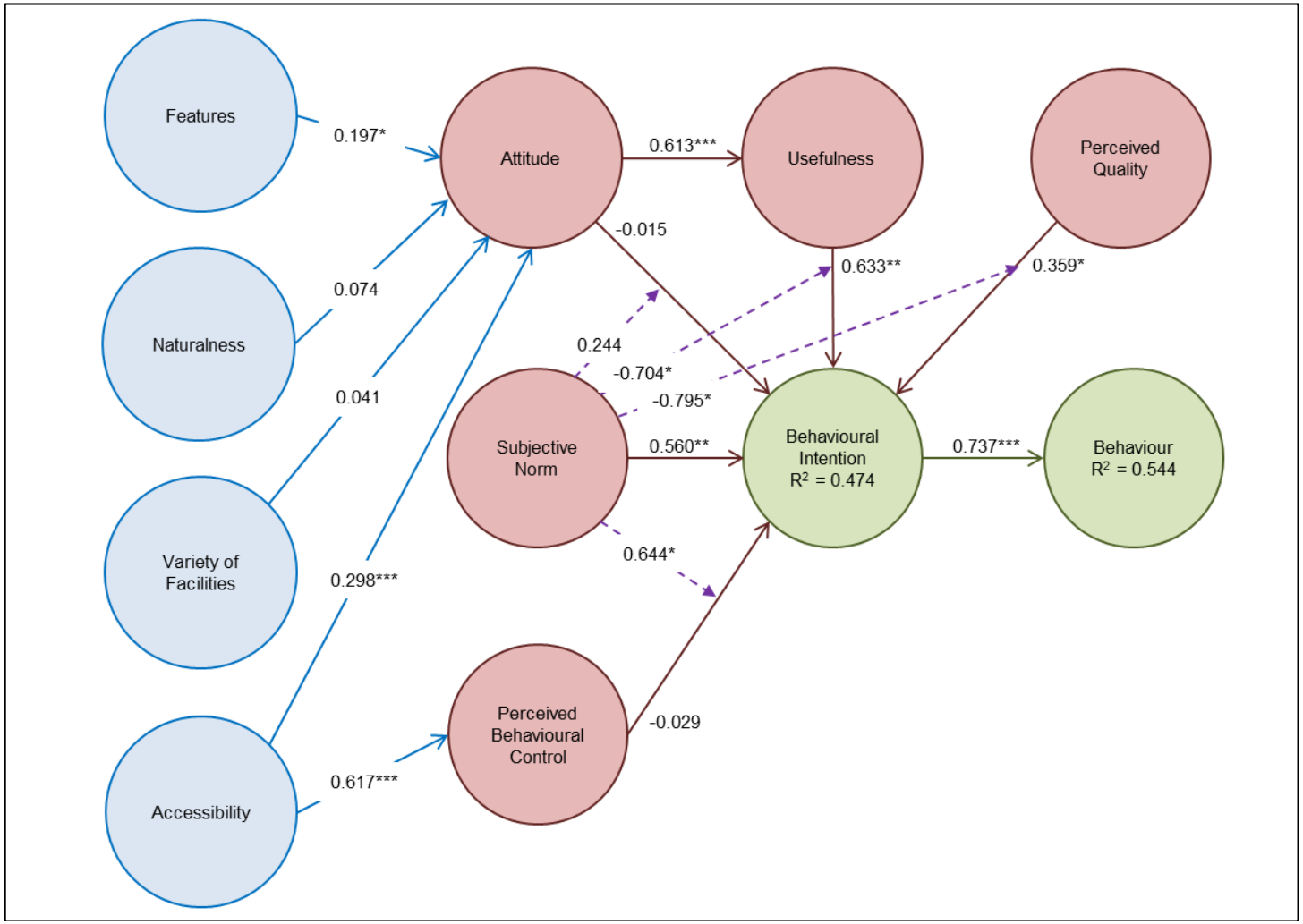

Figure 5.8 The integrated model of UGS usage
(*p < 0.05, **p < 0.01, ***p < 0.001)

Table 5.10 PLS path analysis – the integrated model of UGS usage

Paths	***β***	***t***	**Sig.**
UGS attributes			
FEA → ATT	0.197	2.211	*
NAT → ATT	0.074	1.153	
FAC → ATT	0.041	0.796	
ACC → ATT	0.298	4.375	***
ACC → PBC	0.617	15.519	***
TPB and extended factors			
ATT → USE	0.613	14.121	***
ATT → BI	−0.015	0.117	
SN → BI	0.560	2.631	**
PBC → BI	−0.029	0.241	
USE → BI	0.633	2.883	**
PQ → BI	0.359	1.876	*
BI → BEH	0.737	23.333	***
Moderating Effects of Subjective Norms			
ATT × SN → BI	0.244	0.860	
PBC × SN → BI	0.644	1.844	*
USE × SN → BI	−0.704	2.039	**
PQ × SN → BI	−0.795	2.284	**

Note: *p < 0.05, **p < 0.01, ***p < 0.001
FEA = features; NAT = naturalness; ACC = accessibility; FAC = variety of facilities; USE = usefulness; PQ = perceived quality; ATT = attitude; SN = subjective norm; PBC = perceived behavioural control; BI = behavioural intention; BEH = behaviour

The results also validated the conceptual model developed in Chapter 4. Generally, UGS attributes influence attitudes (i.e. attitude towards urban green, usefulness and perceived quality) and perceived behavioural control of the users. These socio-psychological factors, including subjective norm, explain users' intention to use UGS. Finally intention to use UGS influences the actual

behaviour to use UGS. The schematic representation of the relationships based on the findings of this study is shown in Figure 5.9.

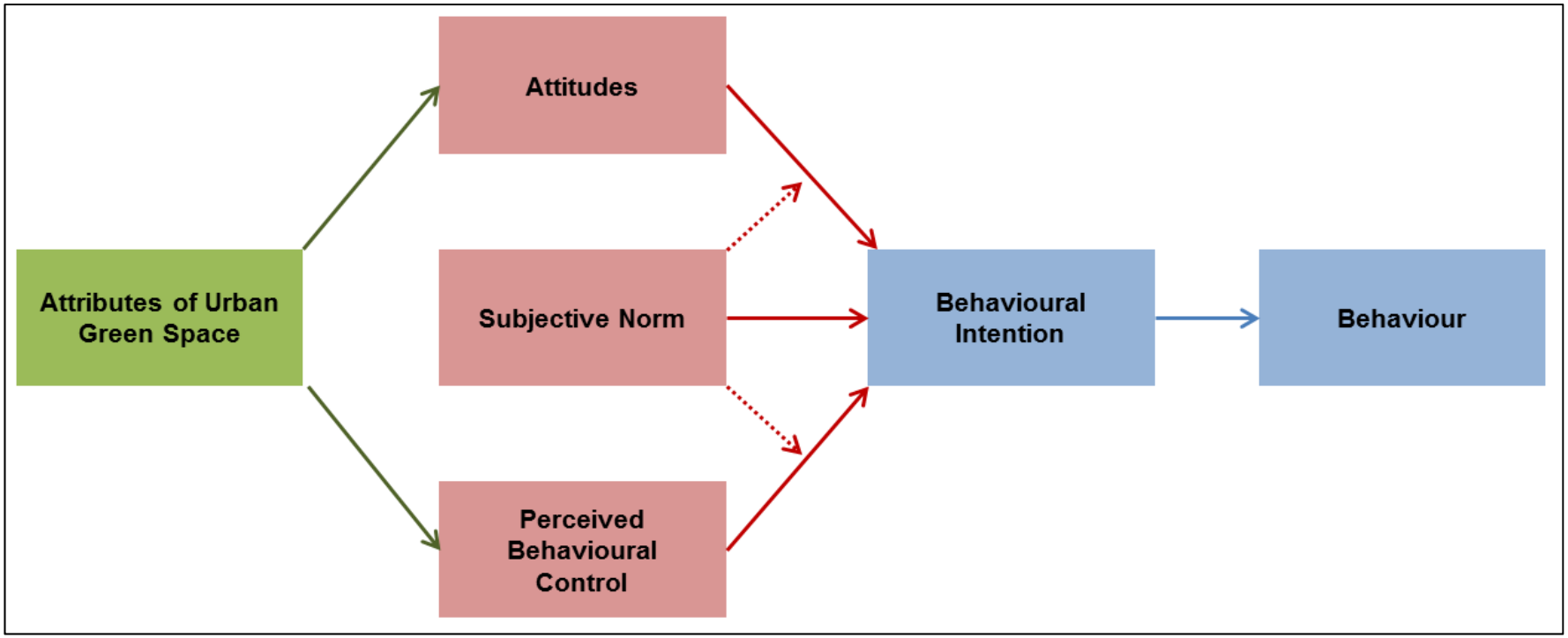

Figure 5.9 Schematic representation of the relationships among UGS attributes, attitudes, subjective norm, PBC, and behaviour

5.8 The Impact of the Control Variables

Prior studies have examined the socio-demographic variations of UGS users, these studies investigated users' motives to use UGS (Shan, 2014), attitudes towards UGS (Lo & Jim, 2012), UGS preferences (Payne et al., 2002), and perception of UGS benefits and functions (Jim & Shan, 2013). Generally, significant differences were found among different socio-demographic groups. To account for the impact of the respondents' demographic background in this study, four demographic variables, gender, age, educational level, and monthly income, were selected and included as in the PLS models. Each of the demographic variables was included as a predictor for the key endogenous construct (i.e., behavioural intention) in the three models presented in Sections 5.5, 5.6 and 5.7, respectively. The results are presented in Table 5.11 and Figure 5.10.

Table 5.11 The effect of the control variables

PLS model	**R^2 (original value)**	**R^2 (with control variables)**	**R^2 change**
The moderating effect model (Figure 5.2)	0.478	0.499	0.021
The mediating effect model (Figure 5.7)	0.423	0.438	0.015
The integrated model of UGS usage (Figure 5.8)	0.474	0.497	0.023

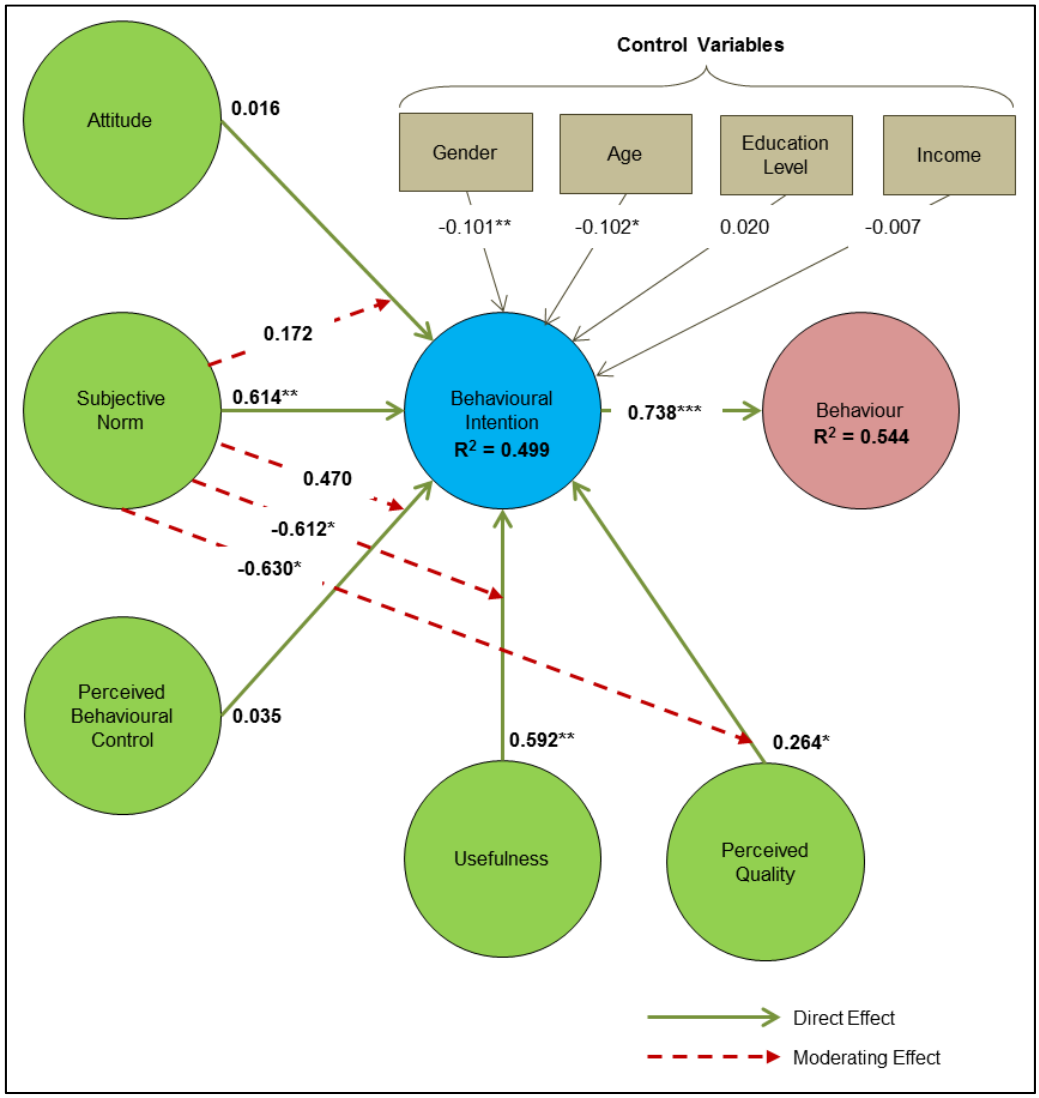

Figure 5.10 Analysis of control variables
(a) the moderating effect model
(*p < 0.05, **p < 0.01, ***p < 0.001)

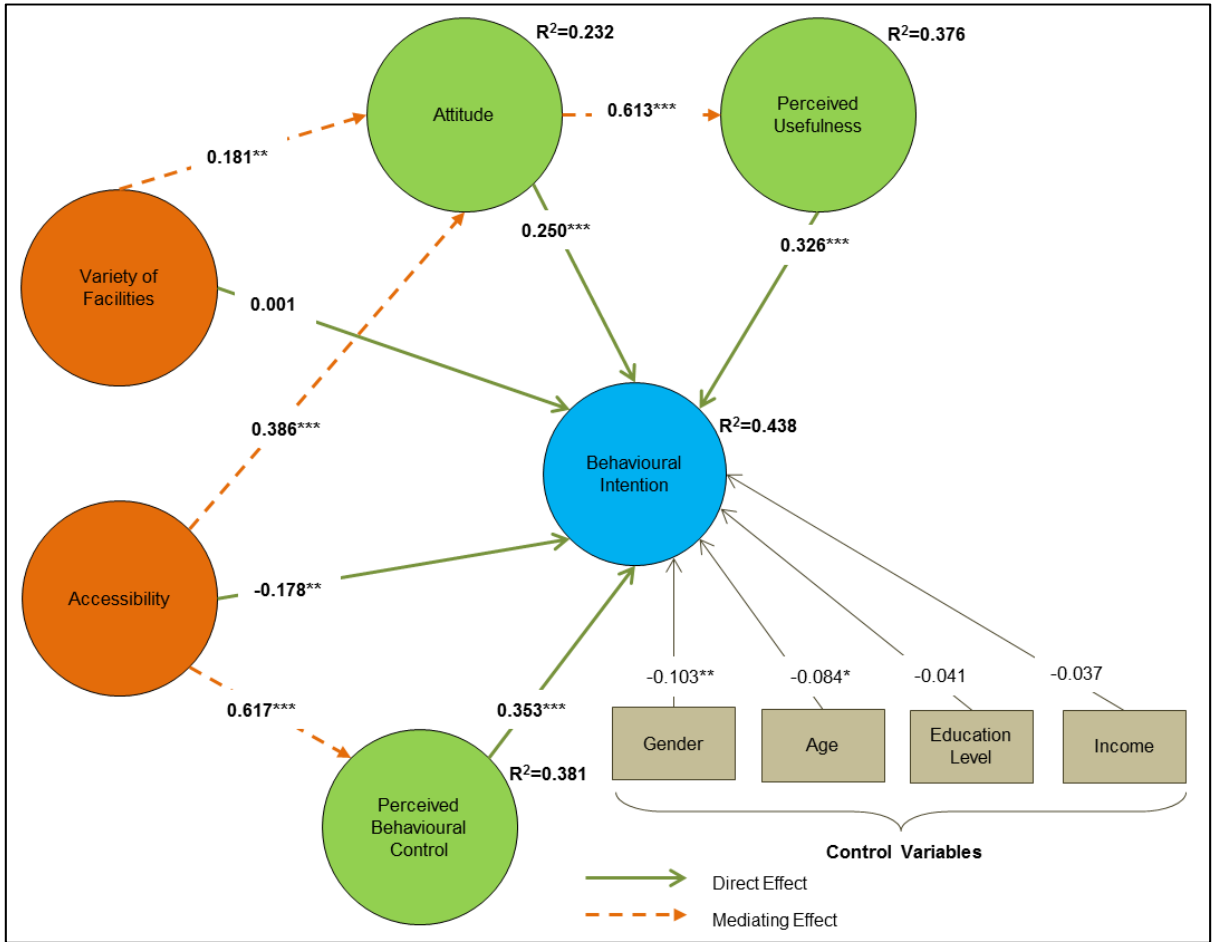

Figure 5.10 Analysis of control variables
(b) the mediating effect model
(*p < 0.05, **p < 0.01, ***p < 0.001)

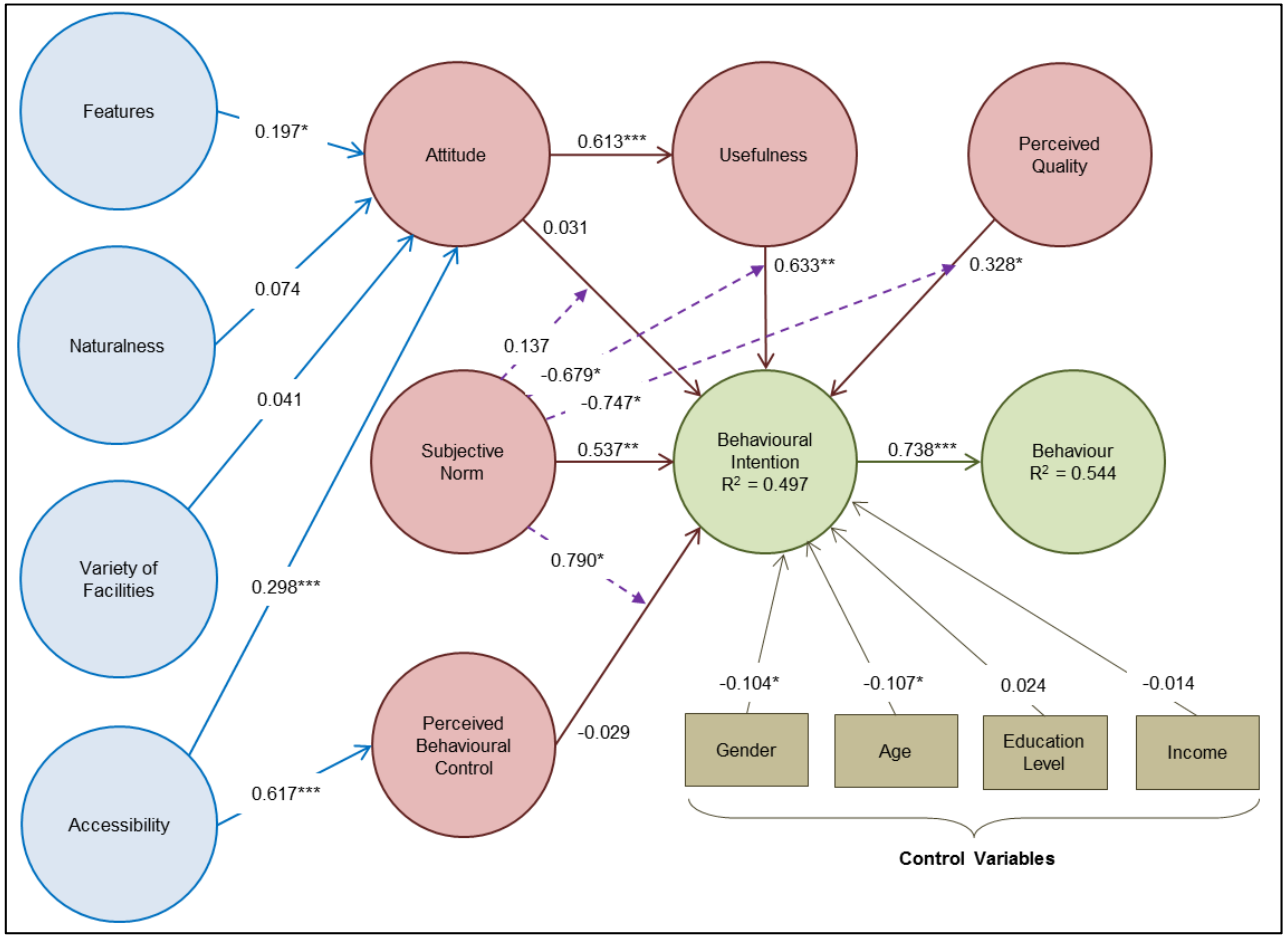

Figure 5.10 Analysis of control variables
(c) the integrated model of UGS usage
(*p < 0.05, **p < 0.01, ***p < 0.001)

The PLS analyses determined that the significant relationships remained unchanged. Moreover, the inclusion of the control variables in the PLS models did not significantly increase the variance explained (R^2). Therefore, the control variables did not cause significant impact on the explanatory power of the PLS models. Among the four control variables, gender and age were significantly correlated with behavioural intentions. The negative significant relationship between gender and behavioural intention indicated that males have a higher level of intention to use UGS than females. Furthermore, the negative significant relationship between age and behavioural intention indicated that elderly has a lower level of intention to use UGS than youngsters. Since demographic variables were not the focal variables in this study, and their impacts on UGS preferences and usage have been excessively studied (Grove et al., 2006), their effects on the dependent variable would not be further investigated and discussed.

5.9 Analysis of Common Method Variance

Harman's single-factor test was conducted by including all of the survey items in the exploratory factor analysis. As mentioned earlier, CMV is present if a single factor emerges from the factor analysis or if a factor accounts for a substantial amount (i.e., over 50%) of variance (Craighead et al., 2011; Messerschmidt & Hinz, 2013; Podsakoff et al., 2003). In this study, a factor analysis of all items identified 10 factors with eigenvalues greater than 1. This explained 71.213% of

the variance, with the first factor accounting for 37.082% (Table 5.12). No significant CMV was observed.

Table 5.12 Harman's single-factor test

	Initial eigenvalues		
Component	**Total**	**% of variance**	**Cumulative %**
1	20.395	37.082	37.082
2	5.231	9.510	46.592
3	2.846	5.174	51.766
4	2.693	4.897	56.663
5	1.742	3.168	59.830
6	1.557	2.831	62.661
7	1.413	2.570	65.231
8	1.187	2.159	67.390
9	1.097	1.995	69.385
10	1.006	1.828	71.213

In addition, following the approach for testing the CMV of PLS models (Ylitalo, 2009), a proxy for CMV was generated by using the first factor that emerged from the factor analysis of all of the measurement items (Podsakoff et al., 2003). The proxy only increased the variance explained in the endogenous construct by 2.4%. The proxy was included in the three models presented in Sections 5.5, 5.6 and 5.7, respectively, as a predictor for the key endogenous construct (i.e., behavioural intention). The PLS analysis determined that the significant relationships remained unchanged. Moreover, the proxy did not significantly increase the variance explained (R^2) (Table 5.13 and Figure 5.11). Thus, this finding indicated that the CMV did not cause a problem in this study.

Table 5.13 The effect of the CMV proxy

PLS model	**R^2 (original value)**	**R^2 (with CMV proxy)**	**R^2 change**
The moderating effect model (Figure 5.2)	0.478	0.491	0.013
The mediating effect model (Figure 5.7)	0.423	0.439	0.016
The integrated model of UGS usage (Figure 5.8)	0.474	0.487	0.013

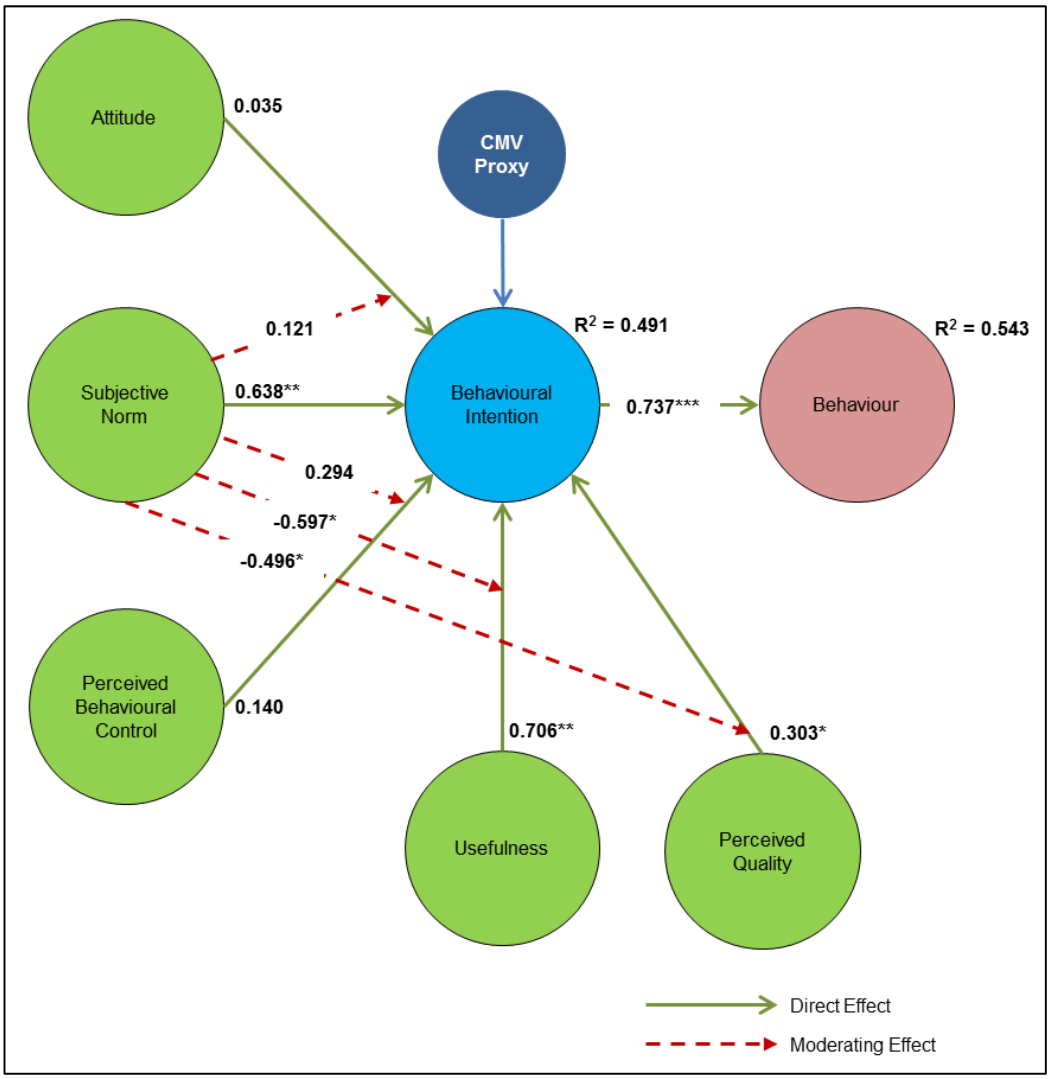

Figure 5.11 Analysis of common method variance
(a) the moderating effect model
(*p < 0.05, **p < 0.01, ***p < 0.001)

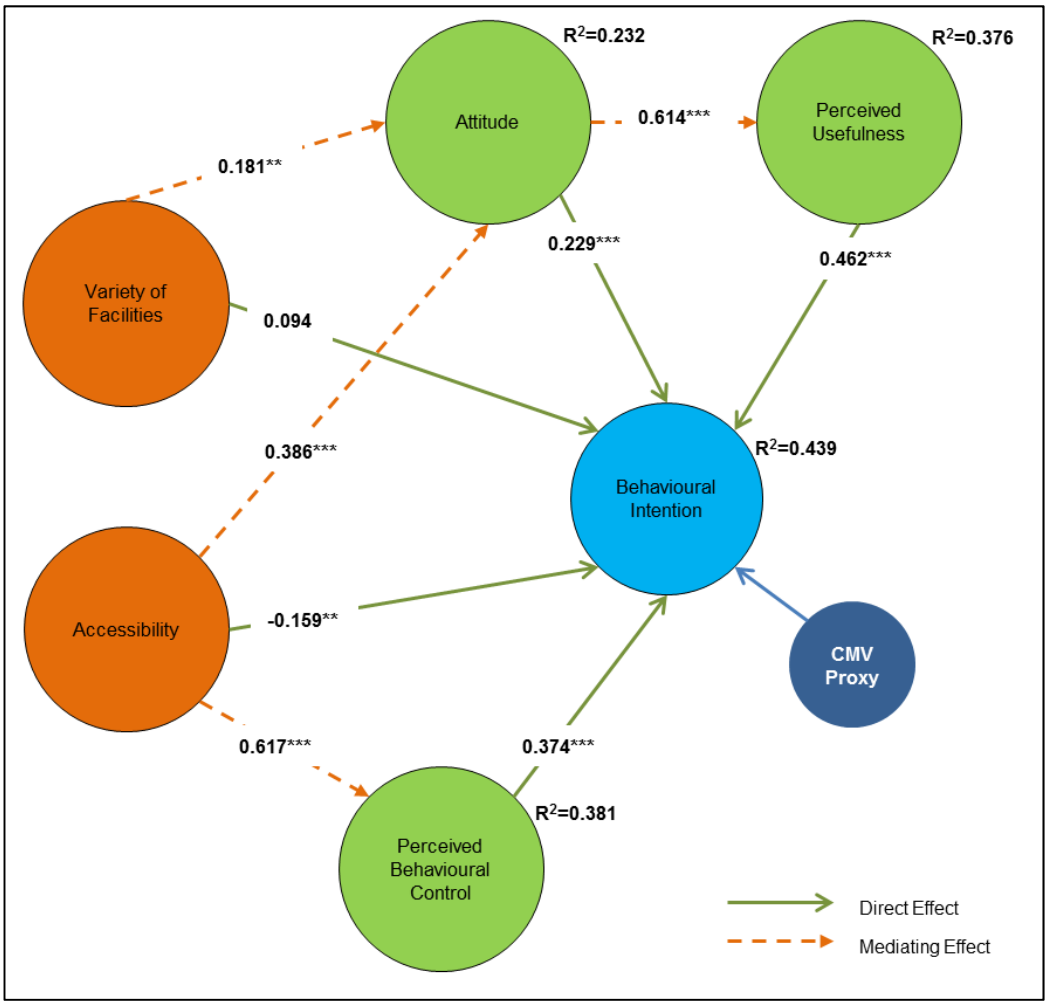

Figure 5.11 Analysis of common method variance
(b) the mediating effect model
(*p < 0.05, **p < 0.01, ***p < 0.001)

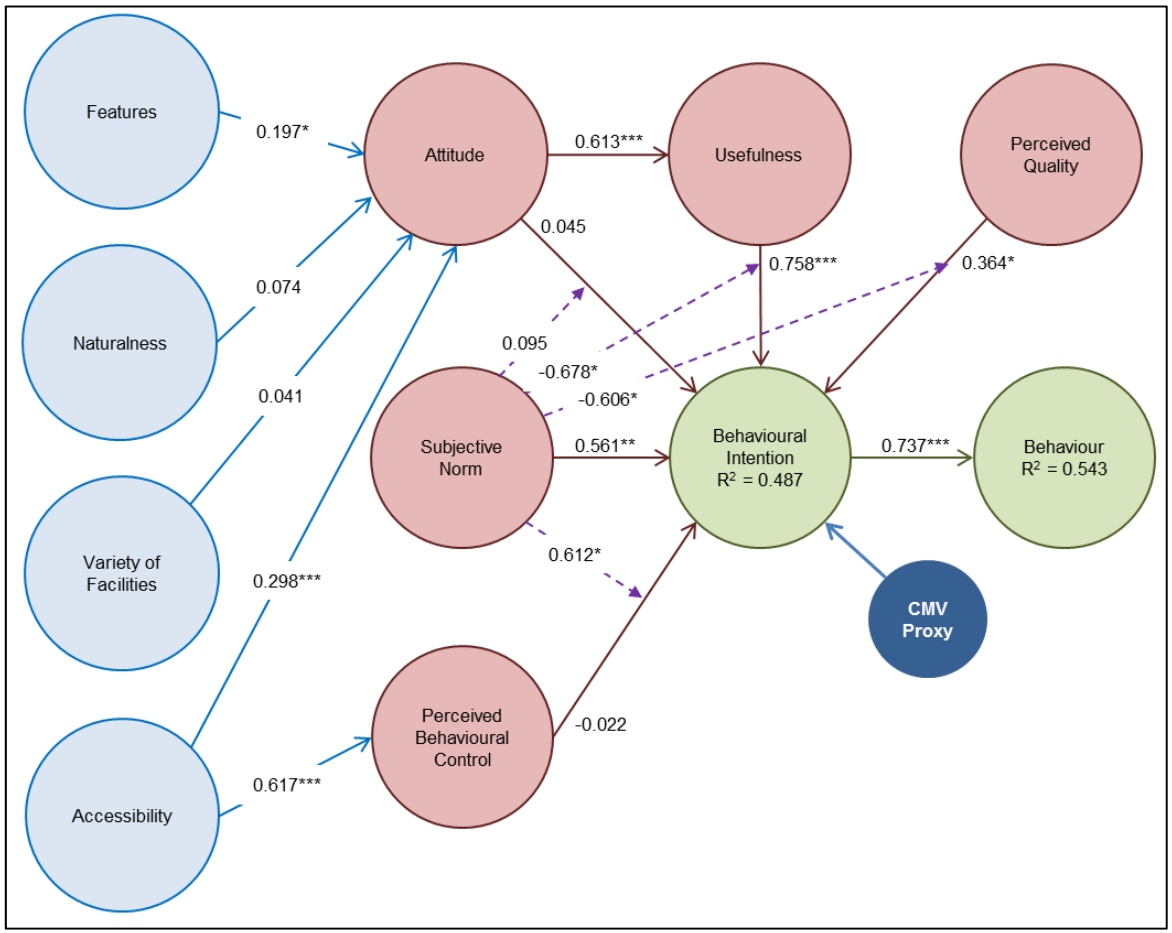

Figure 5.11 Analysis of common method variance
(c) the integrated model of UGS usage
(*p < 0.05, **p < 0.01, ***p < 0.001)

Based on the results of the two tests of CMV, the self-reported measures used in this study are unlikely to be a serious concern for the validity of this study.

5.10 Chapter Summary

This chapter first reported the response rate and respondent profile. In the telephone survey, the sample profile was generally similar to the population profile, except for the group with low educational level, which was found to be underrepresented. In addition, four UGS attributes (features, naturalness, accessibility, and variety of facilities) were identified. The salience of these attributes was tested, with features and accessibility being the strongest predictors of attitudinal factors, including attitude towards the UGS, usefulness, and perceived quality. In addition, accessibility was found to be the strongest predictor of the intention to use UGS. The constructs used in this study were also proven to be statistically reliable and valid.

Notably, subjective norm weakened the influence of usefulness and perceived quality on the intention of users to use UGS. This finding indicates that the usefulness and perceived quality of UGS becomes less important to an individual if he/she is highly influenced by peer groups when it comes to using UGSs.

This chapter also shows the results of the mediating effects of attitudes and PBC. The results proved that attitudes and PBC mediated the influence of UGS

attributes on the intention of user to use UGS. The UGS attributes also indirectly influenced behavioural intention via attitudes and PBC.

PLS path analysis was also conducted on an integrated model of UGS usage incorporating all of the moderating and mediating effects tested. Generally, the results showed that the proposed moderating and mediating effects were statistically significant. In addition, subjective norm also strengthened the relationship between PBC and behavioural intention. In other words, if an individual perceived a high level of PBC, then a strong subjective norm would result in an even higher intention of the individual to use UGS.

Finally, the impact of the control variables (i.e. demographic variables) and CMV were analyzed. The results indicated that the control variables did not cause significant impact on the proved relationships in the PLS analyses, and CMV did not cause any problems in this study.

Chapter 6 Discussion

6.1 Salient UGS Attributes in High-Density Cities

Among the 21 indicators of UGS attributes rated by the respondents, “free of charge facilities” and “convenient opening hours” were rated the highest, with scores of 5.59 and 5.19 of out 7, respectively. Small UGSs provided at the neighborhood level are generally proximate to residential areas and are open from early morning to late evening every day (Leisure and Cultural Services Department, 2014; Planning Department, 2005). Except for sports facilities, e.g., tennis courts and soccer fields, the facilities are generally free of charge. Lo and Jim (2012) reported that distance to UGS is not considered a major problem of UGS by residents in Hong Kong.

Sufficient catering services, aesthetic features, and themed design were rated the lowest (below 4 out of 7), suggesting that the respondents were unsatisfied with these aspects in the UGSs that they visited. Catering services are only provided in large UGSs at the territorial level in Hong Kong. Wong and Domroes (2005) reported that people in Hong Kong dislike the visual scenes of artificially paved surfaces and the lack of attractive landscape elements, e.g., water and vegetation. However, the preferred visual scenes are not readily available in small UGSs in Hong Kong (Lo & Jim, 2010b, 2012), and this may explain the relatively low scores given by the respondents in the current study.

The results indicated that attitude is influenced by features and accessibility; usefulness is influenced by features, accessibility, and variety of facilities, but not naturalness; and attitudinal measure and perceived quality are influenced by all four attributes. Furthermore, two UGS attributes, namely, accessibility and variety of facilities, were correlated with the behavioural intention to use UGS. Generally, the four UGS attributes were found to be salient in terms of their influence on the attitudes and behavioural intentions of the surveyed users. In addition, the attributes identified were generally consistent with previous studies regarding, for example, natural features (Coley et al., 1997), facilities (Bonnes et al., 2011; Kaczynski et al., 2008), and accessibility (Wang et al., 2015).

However, no attributes about safety were elicited in this study. Safety has been commonly identified as an important UGS characteristic in prior studies, which may be explained by the relatively low crime rates in the city (United Nations - Habitat, 2012). Hong Kong is regarded as one of the safest cities in the world. Therefore, safety may not be an important concern of the citizens, and as such, safety was not elicited in the qualitative interviews. Lo and Jim (2012) also reported that security was not a serious concern of UGS users in Hong Kong.

In addition, naturalness was correlated with perceived quality, but not attitude, usefulness, and behavioural intention. Lam et al. (2005) reported that crowded residential areas in Hong Kong result in a high demand to use UGSs. Moreover, people tend to tolerate poor air and noise quality, which might explain why

naturalness was not a relatively strong predictor in this study. Moreover, Lo and Jim (2012) reported that certain environmental functions of UGSs, e.g., soil erosion prevention, habitat for wildlife and noise abatement, are considered less important by Hong Kong citizens because of the prevalence of small UGSs along the roads in the city. The results of this study showed consistency with this finding. As such, no constructs were elicited in the qualitative interviews related to wildlife, noise reduction, and soil erosion prevention.

6.2 The Influence of UGS Attributes

Among the four salient UGS attributes, features and accessibility were identified as the strongest predictors of the attitudes and behaviour of users, respectively.

The two measures of attitudes were usefulness and perceived quality, which were most strongly predicted by the respondents' perceptions regarding the features of UGSs they visited. Based on the results of factor analysis, a nicely themed design, sufficient catering services, educational features (e.g., tree labels and exhibition gallery), aesthetic features (e.g., sculptures), and various events (e.g., flower show and Lunar New Year fairs) were the variables that were highly loaded in the features factor. The key design and management implications are discussed below.

- Identification of the UGS as a themed green space (an item in the features factor) is important because the theme is part of the experience of users (Wong & Cheung, 1999). Lukas (2007) reported that a themed space creates a holistic and integrated organization of space, resulting in a thematic experience. Two examples in Hong Kong are Sun Yat Sen Memorial Park (Figure 6.1), which is designed to commemorate Sun's contribution as the father of modern China, and Lingnan Garden in Lai Chi Kok Park (Figure 6.2), which is designed in traditional Chinese architectural style (Leisure and Cultural Services Department, 2014). These themed parks can serve as role models for other parks aiming for a themed design.

Figure 6.1 Sun Yat Sen Memorial Park
(Source: https://geolocation.ws/v/P/76117592/-/en)

Figure 6.2 Lai Chi Kok Park
(Source: http://discoveringhongkong.discutfree.com/t123-lingnam-garden-in-lai-chi-kok-park)

- The features factor included catering services and a variety of events. As reported by Grahn and Stigsdotter (2010), people enjoy festive events where they can eat, drink, and watch entertainment with others. Therefore, UGS management might consider increasing the catering options and availability and organization of more events, such as flower shows and concerts. A specific location for street performances might also increase the liveliness of UGSs (Simpson, 2011).

- Another features item was educational opportunities, particularly for children. Exposure to UGS tends to stimulate their imagination and inventiveness (Zhou & Parves Rana, 2012), which facilitate intellectual advancement. Therefore, educational elements, such as educational tree labels and exhibition galleries, can be added to UGSs to enhance their educational potential.

- The results showed that the aesthetic aspects of features in UGS positively influenced the attitudes and behaviours of respondents. Parsons and Daniel (2002) proposed that environmental esthetic elements might help people in forming emotional attachments to each other, and thus, strengthen place attachments and result in feelings of psychological comfort (Brown, Perkins, & Brown, 2004; Hidalgo & Hernandez, 2001). Hence, the aesthetic qualities of UGSs could be improved by accentuating their natural features and by improving park maintenance, scenic views, and cleanliness (Giles-Corti et al., 2005; Thompson, 2002).

This study also identified accessibility as a key concern for people when they visit UGS. In fact, this factor had a greater influence on the intention to use UGSs than features, naturalness, or variety of facilities. This result is generally consistent with the results of Holman et al. (1996) and Wang et al. (2015), who found that perceived accessibility influenced the frequency of use of urban open spaces. Although the accessibility construct may be conceptually similar to the

idea that something is too geographically distant (Wong, 2009), the present study operationalized accessibility to include hours of operation, price, and locational convenience. According to Van Herzele and Wiedemann (2003), prices and hours of operation are factors that influence the sense of attractiveness of UGS. In Hong Kong, the underutilization of UGS has repeatedly been criticized in the media, by lawmakers, and by community members. For example, a report of the Audit Commission (2008) revealed that the use of sports facilities in UGS was less than 30%. Thus, in order to encourage the use of UGS, a greater understanding of the multidimensionality of accessibility should be developed, as proposed in the points listed below.

- According to the Leisure and Cultural Services Department (2014), several territorial and district UGSs are open 24 hours a day. Other UGSs open at approximately 6:00 A.M. and close at approximately 11:00 P.M. The relevant public authorities should study the use patterns observed in specific UGSs to determine the preference of users relative to their respective hours of operation.

- Locational convenience is an aspect of accessibility that influences the frequency of visits. Although the Hong Kong planning authority has provided UGSs at the neighborhood level, these spaces are mostly small and of limited use. Lo and Jim (2012) reported that Hong Kong residents preferred large parks. Poudyal et al. (2009) found that people are willing to trade UGS proximity for size. In Hong Kong, UGSs at the neighborhood level are

generally proximate, but people continue to want conveniently located and large parks. Therefore, the locational convenience of large parks should also be considered by the concerned authorities.

- In the RGT interviews, respondents indicated that the fees charged to use parks and open spaces influence the extent of their use. Sports facilities in public parks (e.g., tennis courts and swimming pools) are not free. Again, if authorities are interested in boosting public use of these spaces, then they should consider reviewing and lowering these fees.

6.3 The Influence of the Socio-Psychological Factors

TPB laid a useful foundation for explaining the usage behaviour of UGS. Three TPB variables, namely, attitude, subjective norms, and PBC, were significantly correlated with behavioural intention, and behavioural intention was correlated with user behaviour. This finding is consistent with the empirical results of attitude-behaviour studies conducted in various fields, as discussed previously (Godin et al., 1992; Heath & Gifford, 2002; Mathieson, 1991; Tonglet et al., 2004).

The results also demonstrated that subjective norm, PBC, and usefulness are the most important variables in behavioural intention as each of them contributed approximately 30% to the R^2 of behavioural intention to use UGSs. However, the

contribution of attitude (14%) was comparatively low, and perceived quality was not significantly correlated with behavioural intention.

According to Ajzen (1991), attitudes are defined as comprising instrumental (knowledge) and experiential (feeling) components. In the current study, the measurement scales of attitude and usefulness were adopted from the studies of Carrus et al. (2004) and Balram and Dragićević (2005), respectively. These scales focused on instrumental components, i.e., awareness of the benefits of using UGSs, including recreation, relaxation, and contribution to quality of life. By contrast, the measurement scales of perceived quality adopted from Bonnes et al. (2011) included perceived adequacy, design, conditions and equipment of the UGSs, and focused on individual feelings. The nonsignificant relationship between perceived quality and behavioural intention indicated that users were more influenced by instrumental components of attitude than experiential components.

The major considerations for policymakers on encouraging the use of UGSs can be inferred from the obtained results listed below.

- Positioning participation in using UGSs is a social trend that can enhance the subjective norm of individuals. Social influence has been proven to influence user visits to the UGS (Eyler et al., 1999; Wang et al., 2015), for example, using a promotional campaign to illustrate the popularity of using UGS. In addition, as subjective norm relates to the expectations and behaviours of

significant others, the message of the promotional campaign may be presented by a celebrity who serves as a role model. Ohanian (1990) proposed that the message could be more persuasive if the source, e.g., a celebrity, is credible, which can be enhanced by perceived expertise (knowledge), trustworthiness (confidence), and attractiveness (likability) of the source. In other words, hiring a celebrity to promote the use of UGSs would increase attractiveness, but may not be perceived as improving expertise and trustworthiness. Cialdini et al. (1991) further investigated the influence of social norms and differentiated two types of social influence, namely, injunctive and descriptive norms. Injunctive norms refer to the behaviour commonly approved or disapproved, which is equivalent to the subjective norm in TPB (Heath & Gifford, 2002), while descriptive norms refer to the behaviours demonstrated by most of the members of a particular social setting. For example, a message encouraging the use of UGS via celebrities can be an injunctive norm information, whereas a message showing the frequency or percentage of the local population using UGS would be a descriptive norm information. Schultz et al. (2007) indicated that the relative strength of persuasive appeal between descriptive norms and injunctive norms are inconclusive. Therefore, a message describing the number or percentage of people using UGSs should also be included.

- Promoting the accessibility of UGSs and their convenience in terms of enhancing the PBC of individuals can be considered. In Hong Kong, small UGSs at neighborhood levels are easily accessible. However, Lo and Jim

(2012) reported that Hong Kong residents prefer large UGSs, suggesting that the quest for conveniently located and large parks continues. This finding could be explained by the fact that large parks can provide a sense of spaciousness, which in turn, allows users to move freely and participate in different types of activities without being disturbed or disturbing other users (Björk et al., 2008; Neuvonen et al., 2007). Moreover, PBC also considers an individual's knowledge of a behaviour he/she is about to perform. Therefore, directional signage to show the locations of UGS and usage instructions of the facilities may help encourage a higher level of UGS usage. Similarly, Wang et al. (2015) reported that the perception of users of UGS accessibility are multidimensional. Thus, planning authorities should also consider nonphysical factors, e.g., safety and preferences of users, aside from the physical characteristics of UGSs.

- In order to heighten their usefulness, authorities can also enhance users' knowledge and understanding of UGSs and its benefits. According to the results of the UGS study conducted by Lo and Jim (2012), Hong Kong citizens generally perceive the recreational functions of UGS as more important than the environmental and social functions. Public authorities may thus encourage the use of UGSs by focusing on the recreational functions of UGS. Authorities can also demonstrate the potential psychological and physical benefits to individuals who use UGS, e.g., stress and attention restoration and physical health.

Two of the four moderating effects (i.e., usefulness and subjective norm; perceived quality and subjective norm) were found to have a significant role in enhancing UGS usage in this study. However, the coefficients of the two interaction terms were negatively significant. A possible interpretation is that, if an individual perceives a higher level of subjective norm, then the usefulness and perceived quality of UGSs would have lower effects on behavioural intention. In other words, subjective norms weaken the influence of usefulness and perceived quality on the intention to use UGSs. One common approach to encourage the use of UGSs is to provide good quality space that fulfills the specific needs of users. This approach has been emphasized in prior studies on UGS for identifying the key characteristics influencing the behaviour of users. Nevertheless, when an individual is highly influenced by subjective norm, UGS with low or moderate usefulness and perceived quality may adequately stimulate visitation.

Intervention strategies for individuals with high and low subjective norms should also be differentiated. For individuals with high subjective norm, enhancing usefulness and perceived quality is ineffective to encourage behavioural intentions. However, for individuals with low subjective norm, interventions to increase usefulness and perceived quality would be more effective. Overall, promoting the use of UGSs as a social trend, rather than highlighting the benefits of using these spaces and the quality of these spaces, may be a more effective approach. Social influences are standards that guide the behaviours of individuals

and are shared among members of a group or society (Cialdini & Trost, 1998). These standards and rules serve as cues that help people determine how they are expected to behave, and adherence to social influences can ensure social approval (Cialdini & Goldstein, 2004). Abrahamse and Steg (2013) reported that the use of social influences, learning, and comparison are effective in encouraging desirable behaviours.

6.4 The Relationships among UGS Attributes, Citizen Attitudes and Behaviours

Results showed that two out of the four UGS attributes significantly influenced the behavioural intentions to use UGS, and that behavioural intention is influenced by variety of facilities and perceived accessibility. These findings of the direct effects are consistent with earlier studies, for example, well-equipped facilities and accessibility to the public (Bonnes et al., 2011; Kaczynski et al., 2008; Wang et al., 2015). However, the other two attributes, features and naturalness, were uncorrelated with the intentions to use UGSs. One of the possible explanations of this finding is that people in Hong Kong generally live in a crowded environment (Lam et al., 2005). Despite not having good features and naturalness, UGSs can serve as recreational and social spaces.

In addition, the relationships between the two perceived attributes and behavioural intentions were mediated by attitude towards urban greening. The relationship between attitude and behavioural intention is mediated by perceived

usefulness. Finally, the influence of perceived accessibility on behavioural intention was found to be mediated by PBC. These findings are consistent with the theoretical propositions of Ajzen (1991) and Fishbein and Ajzen (1975), who argued that beliefs are formed when individuals associate certain attributes to a specific object. However, holding many beliefs demands a high level of efforts from individuals. Furthermore, attitudes are formed based on these beliefs as a general and evaluative tendency and influence individual behaviours (Miller, 1956). This attitude-behaviour dyad has been proven in a number of studies in different fields (Beck & Ajzen, 1991; Do Valle et al., 2005; Heath & Gifford, 2002; Mathieson, 1991). This finding may also explain the inconsistent results in prior studies on the influence of UGS attributes on the use of UGSs. Theoretically, beliefs are high in number and each of them may not consistently influence behaviour because of the limited cognitive capacity of individuals to process and evaluate each belief. However, attitudinal factors would be more stable propositions of individuals that influence behaviours because, compared with beliefs, attitudes are comparatively a general tendency towards a particular object. In the context of UGS use, many attributes (similar to beliefs) of the UGS include seating, drinking machine, walking trails, and trees. Although the behaviours of users are influenced by these attributes, users are unable to focus their attention to each of them. Nevertheless, users would exhibit a certain attitude towards the UGS based on these attributes.

In addition to improving the physical quality of UGSs and their attributes, the mediating effects suggest alternative considerations that can help policymakers

encourage the use of UGS, by not only focusing on UGS attributes but also focusing on the attitude and PBC of users. The related implications are listed below.

- There is a need to focus on the attitudes and perceived usefulness of individuals, which can be achieved through educational and promotional programs. From the marketing or promotional perspective, attitudes can be changed by using a variety of strategies (Schiffman, Kanuk, & Wisenblit, 2010), such as changing the motivational function by highlighting the prominent needs to use UGS and associating with an admired group or event to project a favorable image. For example, promotional messages should not only focus on the physical or psychological benefits but also illustrate how the use of UGSs may change lifestyles, social relationships, and even property values. These policies can then lead to positive attitudes towards the UGS, and subsequently, a higher intention to use UGS.

- There is a need to enhance knowledge and perceived accessibility in relation to the use of UGSs. For example, a promotional program may highlight the ease of use of facilities in UGSs and the convenience of accessing UGSs. In this study, accessibility is operationalized as locational convenience, opening hours, and charges. Therefore, authorities that manage UGSs should continuously consider the opinions of users when reviewing the appropriateness of opening hours and charges.

6.5 Generalisability of the Conceptual Model

As discussed in Chapter 5.7, this study validated the conceptual model in which UGS attributes influence attitudes (i.e. attitude towards urban green, usefulness and perceived quality) and perceived behavioural control of the users. These socio-psychological factors, including subjective norm, explain users' intention to use UGS. Subjective norm moderates the relationship between attitudes and perceived behavioural control. Finally intention to use UGS influences the actual behaviour to use UGS. The conceptual model explains the relationships among UGS attributes, socio-psychological factors and behaviours, it can serve as the foundation for other studies on UGS usage.

Although the conceptual model can be applied on UGS studies in other high density cities, the UGS attributes identified in the current study, including features, naturalness, accessibility, and variety of facilities, may be unique to Hong Kong. Unlike other UGS studies in other western cities, this study showed that safety and security were not serious concerns of UGS users in Hong Kong. In addition, naturalness was not a strong predictor in this study which could be explained by the crowded residential areas and prevalence of small UGSs along the roads in Hong Kong. Therefore, the users tend to tolerate the poor environmental qualities and functions of UGSs in the city. As suggested by Schipperijn, Stigsdotter, et al. (2010), policymakers and planners should develop a reasoned understanding of the specific needs and preferences of city dwellers.

As there are contextual and cultural diversities among cities, studies on UGS usage should identify their own lists of salient UGS attributes and investigate the impact of the attributes on users' attitudes and behaviours.

6.6 Chapter Summary

This chapter compares the findings of this study with those of prior studies and discusses the planning, design, and policy implications in the use of UGS. First, features and accessibility were found to be strongest factors influencing the attitudes and the intention of users to use UGS, respectively. Therefore, efforts should be made to improve these two attributes.

In addition, subjective norm was observed to have a moderating impact on the relationships between two attitudinal factors and behavioural intention. This finding implies that public authorities may not have to enhance the usefulness and quality of the UGS, but simply communicate with the public that UGS use is a social trend and is commonly adopted by the rest of the general public.

Furthermore, this chapter explains the association between UGS attributes, attitudes, and behaviour. As this study proved that attributes influence behaviours via attitudes, public authorities and UGS management may encourage the use of UGSs by enhancing the attitudes of users towards such UGSs. For example, highlighting the potential benefits of using UGS may effectively encourage the use of UGSs. Furthermore, promotional campaigns would be more

effective and efficient, particularly in high-density cities with physical constraints on the provision of large and high-quality UGSs.

Finally, this chapters discusses the generalisability of the findings in this study. It is suggested that the conceptual model can be applied in other contexts, however each city may have their own list of salient UGS attributes.

Chapter 7 Conclusions

7.1 Review of the Research Objectives and Summary of Key Research Findings

As discussed in Chapter 1, this study aims to examine the key factors influencing the use of UGSs in Hong Kong. The three objectives are as follows: (1) to identify the salient UGS attributes in Hong Kong and examine their influence on the behaviours of users; (2) to develop and validate a conceptual model to explain the use of UGSs; and (3) to draw policy and design implications for encouraging the use of UGSs.

Regarding objective (1), this study applied the RGT and elicited 21 constructs from UGS users in Hong Kong. These 21 constructs were subsequently included in a questionnaire, which was administered through a telephone survey with 263 valid responses. According to the exploratory factor analysis, the 21 constructs were grouped into four key variables (i.e., attributes): features, naturalness, accessibility, and variety of facilities. The influences of these attributes on the attitudes and behaviours of users were analyzed statistically using PLS, in order to examine the salience of these attributes. The results showed that features were strong predictors of the attitudes of users. By contrast, accessibility was the strongest predictor of users' behavorial intention to use UGS.

This study adopted TPB and proposed to examine (a) two more attitudinal factors included in the model, (b) the moderating effects of subjective norm, and (c) the mediating effects of attitudes and PBC to achieve objective (2). The results showed that TPB factors significantly correlated with the intention of users to visit UGSs. Notably, users were more influenced by instrumental components of attitude than experiential components, i.e., perceived benefits/consequences over feelings. In addition, subjective norm negatively moderated the influence of usefulness and perceived quality on intention to visit the UGSs. In other words, if an individual is highly encouraged by significant others, e.g., family, peers, and coworkers, to use UGSs, then the perceived usefulness and quality of the UGSs become less important. Finally, the mediating effects of attitude and PBC were examined. Attitudes were determined to be a mediator of the effect of two attributes of UGSs, i.e., variety of facilities and accessibility, on the intention of users to use UGSs. Furthermore, PBC mediated the relationship between accessibility and intention to use UGSs.

Policy and design implications were drawn based on the research results to accomplish objective (3). First, this study identified four key attributes of UGSs. Among them, features was found to be the strongest predictor of the attitudes of users. Therefore, improving the features of UGSs, e.g., theme and catering service, would lead to users having favorable attitudes towards the UGSs. However, users' intention to visit UGSs were strongly influenced by accessibility. As reported by Wang et al. (2015), accessibility is more complicated than

physical proximity. The present study proposed that improvement of accessibility should consider opening hours and charges, in addition to locational convenience. Therefore, authorities who manage UGSs should regularly review the needs and preferences of users to increase the utilization of the spaces. In mainstream studies on UGSs, considerable research efforts had been exerted to identify the most preferable or desirable characteristics. However, the results showed that the behaviours of users were moderated by subjective norm and mediated by attitude and PBC.

The aforementioned result provides an important insight into ways to encourage the use of UGSs. Undoubtedly, improving the quality of UGSs can fulfill the needs of users and encourage frequent visits. However, in high-density cities, the physical limitations may result in UGSs that are smaller, inadequately equipped, and of poor environmental quality. In this case, public authorities may alternatively use promotional programs to influence the attitudes of users, subjective norm, and PBC to encourage visitation of users. The use of promotional programs would ensure that users obtain the physical, psychological, and social benefits of using UGSs, despite prevailing concerns related to land resource scarcity.

7.2 Contributions and Significance

The results of this research can help address the preferences of users and ensure the effective utilization of scarce land resources, particularly in high-density

cities, such as Hong Kong. This research contributes to the planning and designing of UGSs theoretically and practically.

First, theoretically, the conceptual model in this study added two additional attitudinal constructs, namely, usefulness and perceived quality. This study proved the relevance of usefulness to behavioural intention to visit UGSs. This study proposes that the instrumental components of attitudes have a stronger influence on the behaviour of users in the context of UGSs visitation. By applying TPB, the moderating effects of subjective norm were examined. Results showed that the influences of usefulness and perceived quality on behavioural intention were negatively moderated. Following the assumption of TPB, we find that beliefs influence behaviours through attitudes. The majority of previous studies focused on identifying UGS characteristics and examining their influence on usage. By contrast, this study suggests an alternative explanation of UGS usage. The results significantly improved our comprehension of how users of UGS are influenced and explained the mixed results identified in prior studies.

Second, practically, this study identified four salient attributes of UGS users in Hong Kong. The results showed that, although the attributes are similar to those identified in other areas, certain significant differences are identified. For instance, safety is not a concern of users in Hong Kong and accessibility should cover opening hours and charges. In addition, features and accessibility are found to be the strongest predictors of the attitudes and behaviours of users to use UGS, respectively. This finding indicates that authorities tasked to manage UGSs

should carefully review the opening hours and charges for sports facilities in the UGSs to encourage a higher level of UGS use.

Third, the results of the moderating and mediating effects investigated in this study practically imply alternative promotional approaches for encouraging the use of UGS. In addition to the conventional approaches to improve facilities, maintenance and locations, the authorities can highlight the social trend, potential benefits, and convenience of using UGS among the potential users. This approach would be particularly useful for public authorities in high-density cities where the development of large and environmentally sound UGSs is constrained by physical limitations.

7.3 Research Limitations

This study was limited in ways that can be addressed by future research. First, the small sample size of the telephone survey and its selectivity of highly educated respondents, which overrepresented the attitudes and behaviours of relatively well-educated people, limited the study. As such, the results of this study may not effectively represent the views of low-educated groups.

Second, UGSs in Hong Kong and users are unique. Hence, the results pertaining to UGSs in Hong Kong and users may not be generalizable to other cities or cultural contexts.

Third, all of the measures developed from the telephone survey data were self-reported, which may lead to spurious relationships between measures and threaten the validity of the study.

Finally, the R^2 values of the PLS models were approximately 50%. Although this result indicated that moderate levels of variance were explained, several other variables may also influence the behaviours of UGS users.

7.4 Recommendations for Future Research

In order to address the limitations discussed previously, future studies can verify and validate the results of this study by replicating the analysis on a larger and more representative sample. Further research is also needed to apply the model in different cultural and spatial contexts.

UGS provision has been regarded as an important indicator of urban sustainability (Mega & Pedersen, 1998; Olewiler, 2006; Shen et al., 2011). Chiesura (2004) also suggested that UGSs are important components of sustainable development because of their environmental, economic and social benefits to urban populations. James et al. (2009) suggested that the contribution of UGS to sustainable development is one of the emergent research areas. As the current study focused on users' attitudes and behaviours towards UGS usage, future studies can investigate how UGS provision contributes to the sustainability of cities.

In addition, the increasing trend of mobile-only population may cause significant non-coverage bias of landline telephone survey in future; thus, further studies should consider using a dual sampling frame, that is, landline telephone list and mobile phone list (Hu, Balluz, Battaglia, & Frankel, 2011).

Future studies may consider including objectively measured behaviours, for example, by observing actual usage behaviours of UGS. The findings could be used to address the limitation of self-reported behaviours and minimize the effect of CMV. In addition, measuring behaviours objectively would also allow the incorporation of habit, as proposed in TIB. This is because using self-reported measures cannot effectively differentiate habit (occurrence of past behaviours) and behaviour (self-reported behaviours).

In view of the moderate levels of variance explained in the PLS models, other factors that can predict the use of UGS were not accounted for in this study. Therefore, future research may consider other factors, such as socioeconomic and physical environmental factors, in addition to the socio-psychological factors and perceived UGS attributes considered in the current study. These factors may also be explanatory. Although the impacts of the demographic variables were statistically controlled in this study, gender and age were found to be significant predictor of behaviour intention to use UGS. Therefore, further research may consider to perform multigroup analyses (Sarstedt, Henseler, & Ringle, 2011) for

comparing the socio-psychological differences among different socio-demographic groups.

Finally, although perceived UGS attributes have been reported in the literature to be better predictors of the attitudes and behaviours of users, associations between objective and subjective UGS attributes exist. Future research can thus investigate the relationship between objective and subjective UGS attributes, in order to obtain a better understanding on the psychological evaluative process of how a physical UGS attribute may eventually influence the behaviours of users.

Appendix 1 – Questionnaire

Questionnaire Survey on Urban Green Spaces in Hong Kong
香港公共休憩用地 問卷調查

Background 背景

The Government currently provides more than 1,500 urban green spaces in Hong Kong. The prime function of these spaces includes conservation of the natural environment, amenity and visual purposes, provision of recreation facilities for the enjoyment of the general public. Urban green spaces cover parks, gardens, sitting-out areas, waterfront promenades, paved areas for informal games, children's playgrounds, etc.

現時香港政府提供超過 1,500 個公共休憩用地，主要功能包括保育自然環境、美化市容、改善景觀、提供運動及康樂設施供公眾享用。在香港，公共休憩用地包括公園、花園、休憩處、海濱長廊、休閒活動地點、兒童遊樂場等。

All the given information will be kept in confidential and used for academic purpose only.
本調查以不記名方式進行，所有收集之資料將會保密，只供學術分析之用。

I. Attributes of Urban Green Spaces 對公共休憩用地的特點

Please indicate your degree of agreement on the statements by circling the appropriate answer.
由 1 至 7 分，以 1 分為最低分表示「十分不同意」，7 分為「十分同意」，請就以下項目評分：

Statement 句子	**Strongly Disagree 十分不同意**						**Strongly Agree 十分同意**
1. Urban green spaces provide facilities for all weather conditions. 公共休憩用地提供適合不同天氣狀況的設施。	1	2	3	4	5	6	7
2. Urban green spaces provide wide range of facilities. 公共休憩用地提供多種類形的設施。	1	2	3	4	5	6	7
3. Urban green spaces provide sufficient ancillary facilities. (e.g. drinking, washroom) 公共休憩用地提供足夠的輔助設施（如飲水機、洗手間）。	1	2	3	4	5	6	7
4. The air quality is good in urban green spaces. 公共休憩用地的空氣良好。	1	2	3	4	5	6	7

5.	There are sufficient spaces in urban green spaces. (not crowded) 公共休憩用地有足夠的空間。（不擠迫）	1	2	3	4	5	6	7
6.	There are clear divisions of areas for various activities in urban green spaces. 公共休憩用地有明確劃分區域給不同活動。	1	2	3	4	5	6	7
7.	Urban green spaces provide natural environment. 公共休憩用地提供大自然環境。	1	2	3	4	5	6	7
8.	Urban green spaces provide sufficient catering services. 公共休憩用地提供足夠的餐飲服務。	1	2	3	4	5	6	7
9.	The facilities management in urban green spaces is good. 公共休憩用地內有良好的設施管理。	1	2	3	4	5	6	7
10.	Urban green spaces provide beautiful scenic view. 公共休憩用地提供優美的景觀。	1	2	3	4	5	6	7
11.	There are aesthetic features in urban green spaces (e.g. sculpture). 公共休憩用地內有美學及藝術的元素（如雕塑）。	1	2	3	4	5	6	7
12.	Urban green spaces provide sufficient seating. 公共休憩用地提供足夠的座位。	1	2	3	4	5	6	7
13.	Urban green spaces are accessible through public transportation. 公共交通工具可以方便抵達公共休憩用地。	1	2	3	4	5	6	7
14.	Urban green spaces provide barrier free facilities for elderly / disabled persons. 公共休憩用地提供無障礙設施給老年人及殘疾人士。	1	2	3	4	5	6	7
15.	Urban green spaces have nice themed design. 公共休憩用地有良好的主題設計。	1	2	3	4	5	6	7
16.	There are educational features in urban green spaces (e.g. tree labels, exhibition gallery). 公共休憩用地內有教育的元素（如樹木標籤、展覽廳）。	1	2	3	4	5	6	7
17.	Various events are organized in urban green spaces (e.g. flower show, Lunar New Year fairs). 公共休憩用地有舉辦各項不同的活動（如花卉展、農曆年宵市場）。	1	2	3	4	5	6	7
18.	Urban green spaces provide facilities for specific interests. 公共休憩用地提供不同種類的設施滿足不同人仕。	1	2	3	4	5	6	7

19. Urban green spaces are conveniently located near my home. 公共休憩用地位於我家附近。	1	2	3	4	5	6	7
20. The opening hours of urban green spaces are convenient. 公共休憩用地的開放時間方便。	1	2	3	4	5	6	7
21. The facilities in urban green spaces are free of charges. 公共休憩用地內的設施是免費。	1	2	3	4	5	6	7

II. Attitude and Behaviour towards urban green spaces 對公共休憩用地的看法及使用

Please indicate your degree of agreement on the statements by circling the appropriate answer.
由 1 至 7 分，以 1 分為最低分表示「十分不同意」，7 分為「十分同意」，請就以下項目評分：

Statement 句子	**Strongly Disagree 十分不同意**						**Strongly Agree 十分同意**
Usefulness 效用							
22. I use urban green spaces to relax. 我使用公共休憩用地來放鬆身心。	1	2	3	4	5	6	7
23. I use urban green spaces for recreation. 我使用公共休憩用地來進行康樂活動。	1	2	3	4	5	6	7
24. Urban green spaces contribute to my quality of life. 公共休憩用地能提升我的生活質素。	1	2	3	4	5	6	7
25. Urban green spaces would increase my property value. 公共休憩用地能提升我的物業價值。	1	2	3	4	5	6	7
Perceived Quality 質量							
26. There are parks where children can play freely. 香港有公園給兒童自由地玩耍。	1	2	3	4	5	6	7
27. There are enough urban green spaces. 香港有足夠的公共休憩用地。	1	2	3	4	5	6	7
28. Urban green spaces are in good condition. 公共休憩用地的質素良好。	1	2	3	4	5	6	7
29. The urban green spaces are well-equipped 公共休憩用地的設備及設施優良。	1	2	3	4	5	6	7
30. The urban green spaces are well-designed 公共休憩用地的設計優良。	1	2	3	4	5	6	7
Attitudes towards Urban Green 對都市綠化的看法							
31. If one had more contact with nature in the city, he/she would feel less stress. 如果有更多與大自然接觸的機會，有助舒緩我們的壓力。	1	2	3	4	5	6	7

32. The presence of green in the city makes us feel more alive. 城市中的綠化地帶使我們感覺更有活力。	1	2	3	4	5	6	7
33. In the city people need nature for psychological restoration. 大自然有助城市人修復身心。	1	2	3	4	5	6	7
34. In the city one can ease tensions just by watching a green area. 綠化地帶有助城市人緩和緊張情緒。	1	2	3	4	5	6	7
35. Being in a city green area can also help to improve the relationships with others. 公共休憩用地可改善與他人的關係。	1	2	3	4	5	6	7
Subjective norm 主觀標準							
36. Most people would think that using urban green spaces is a good idea. 大多數人喜歡使用公共休憩用地。	1	2	3	4	5	6	7
37. My friends would think I should use urban green spaces. 我的朋友覺得我應該使用公共休憩用地。	1	2	3	4	5	6	7
38. My family would think I should use urban green spaces. 我的家人覺得我應該使用公共休憩用地。	1	2	3	4	5	6	7
39. My co-workers or schoolmates would think I should use urban green spaces. 我的同事或同學覺得我應該使用公共休憩用地。	1	2	3	4	5	6	7
Perceived behavioural control 認知的行為控制							
40. I have plenty of opportunities to use urban green spaces. 我有足夠的機會使用公共休憩用地。	1	2	3	4	5	6	7
41. I have enough time to use urban green spaces. 我有足夠的時間使用公共休憩用地。	1	2	3	4	5	6	7
42. Using urban green spaces is convenient and easy. 使用公共休憩用地是方便及容易的。	1	2	3	4	5	6	7
43. I know where urban green spaces are. 我知道公共休憩用地的地點。	1	2	3	4	5	6	7
44. I know how to go to urban green spaces. 我知道怎樣去公共休憩用地。	1	2	3	4	5	6	7
45. I know how to use the facilities at urban green spaces. 我知道怎樣使用公共休憩用地的設施。	1	2	3	4	5	6	7

Perceived effectiveness of government policy 政策的有效性							
46. The Government allocates sufficient land for public open spaces. 政府分配足夠的土地作公共休憩用地。	1	2	3	4	5	6	7
47. The Government provides sufficient facilities in public open spaces to cater for widespread public demand. 政府提供足夠數量的公共休憩用地及康樂設施，以應付廣泛公眾對康樂活動的需求。	1	2	3	4	5	6	7
48. The Government provides open space provided of high quality, in terms of facilities, layout and design which meet the needs and aspirations of the users. 政府提供的公共休憩用地具高質素及水平，包括康樂設施，布局和設計方面，滿足使用者的需要及期望。	1	2	3	4	5	6	7
49. The Government effectively plans, distributes and designs public open spaces 政府有效地規劃、分布及設計公共休憩用地。	1	2	3	4	5	6	7
Behavioural intention 行為意向							
50. I plan to visit / use urban green spaces. 我計劃去或使用公共休憩用地。	1	2	3	4	5	6	7
51. I intend to visit / use urban green spaces in the next 4 weeks. 在未來四個星期，我打算去或使用公共休憩用地。	1	2	3	4	5	6	7
52. I will visit / use urban green spaces every time I have an opportunity. 如有機會，我會去或使用公共休憩用地。	1	2	3	4	5	6	7
Behaviour 行為							
53. I have visited / used urban green spaces in the past 4 weeks. 在過去四個星期，我有去或使用公共休憩用地。	1	2	3	4	5	6	7
54. I have been visiting / using urban green spaces regularly in the past 4 weeks. 在過去四個星期，我有定期去或使用公共休憩用地。	1	2	3	4	5	6	7
55. I have been visiting / using urban green spaces often. 我經常去或使用公共休憩用地。	1	2	3	4	5	6	7

III. Personal Information 個人資料

56. Gender 性別
☐ Male 男 ☐ Female 女

57. Age 年齡

☐ 18-24 ☐ 25-34 ☐ 35-44 ☐ 45-54 ☐ 55-64
☐ >=65

58. Education Level 教育程度
☐ Primary 小學 ☐ Secondary 中學 ☐ Post-secondary 專上教育

59. Marital Status 婚姻狀況
☐ Single 單身 ☐ Married 已婚

60. Personal Monthly Income 個人每月收入 (HKD 港幣)
☐ <10,000 ☐ 10,000 – 19,999 ☐ 20,000 – 29,999 ☐ 30,000 – 39,999
☐ >=40,000

61. Type of Housing 居住房屋類型
☐ Private Housing 私人房屋(私人樓)
☐ Public Housing (including public rental housing, home ownership housing and sandwich class housing) 公共房屋(包括公屋、居屋、夾屋)

62. Does your housing estates / building provide green spaces for residents? 你居住的屋苑/大廈有否為居民提供綠化休憩用地？
☐ Yes 有 ☐ No 無

Appendix 2 – Mapping of Questionnaire Items and Construct Indicators

Construct	Indicators	Statement	Question Number (Appendix 1)
Features (FEA)	FEA1	Urban green spaces have nice themed design.	15
	FEA2	Urban green spaces provide sufficient catering services.	8
	FEA3		16
	FEA4	There are educational features in urban green spaces (e.g. tree labels, exhibition gallery).	11
	FEA5	There are aesthetic features in urban green spaces (e.g. sculpture).	17
	FEA6	Various events are organized in urban green spaces (e.g. flower show, Lunar New Year fairs).	9
	FEA7	The facilities management in urban green spaces is good.	12
	FEA8	Urban green spaces provide sufficient seating.	18
	FEA9	Urban green spaces provide facilities for specific interests.	13
	FEA10	Urban green spaces are accessible through public transportation.	14
	FEA11	Urban green spaces provide barrier free facilities for elderly / disabled persons.	10
Naturalness (NAT)	NAT1	There are sufficient spaces in urban green spaces. (not crowded)	5
	NAT2	There are clear divisions of areas for various activities in urban green spaces.	6
	NAT3	Urban green spaces provide natural environment	7
	NAT4	The air quality is good in urban green spaces.	4
Accessibility (ACC)	ACC1	Urban green spaces are conveniently located near my home.	19
	ACC2	The opening hours of urban green spaces are convenient.	20
	ACC3	The facilities in urban green spaces are free of charges.	21
Variety of Facilities (FAC)	FAC1	Urban green spaces provide facilities for all weather conditions.	1
	FAC2	Urban green spaces provide wide range of facilities.	2
	FAC3	Urban green spaces provide sufficient ancillary facilities. (e.g. drinking, washroom)	3
Usefulness (USE)	USE1	I use urban green spaces to relax.	22
	USE2	I use urban green spaces for recreation.	23
	USE3	Urban green spaces contribute to my quality of life.	24
	USE4	Urban green spaces would increase my property value.	25
Perceived Quality (PQ)	PQ1	There are parks where children can play freely.	26
	PQ2	There are enough urban green spaces.	27
	PQ3	Urban green spaces are in good condition.	28
	PQ4	The urban green spaces are well-equipped	29
	PQ5	The urban green spaces are well-designed	30

Attitude (ATT)	ATT1	If one had more contact with nature in the city, he/she would feel less stress.	31
	ATT2	The presence of green in the city makes us feel more alive.	32
	ATT3	In the city people need nature for psychological restoration.	33
	ATT4	In the city one can ease tensions just by watching a green area.	34
	ATT5	Being in a city green area can also help to improve the relationships with others.	35
Subject Norm (SN)	SN1	Most people would think that using urban green spaces is a good idea.	36
	SN2	My friends would think I should use urban green spaces.	37
	SN3	My family would think I should use urban green spaces.	38
	SN4	My co-workers or schoolmates would think I should use urban green spaces.	39
Perceived Behavioural Control (PBC)	PBC1	I have plenty of opportunities to use urban green spaces.	40
	PBC2	I have enough time to use urban green spaces.	41
	PBC3	Using urban green spaces is convenient and easy.	42
	PBC4	I know where urban green spaces are.	43
	PBC5	I know how to go to urban green spaces.	44
	PBC6	I know how to use the facilities at urban green spaces.	45
Behavioural Intention (BI)	BI1	I plan to visit / use urban green spaces.	50
	BI2	I intend to visit / use urban green spaces in the next 4 weeks.	51
	BI3	I will visit / use urban green spaces every time I have an opportunity.	52
Behaviour (BEH)	BEH1	I have visited / used urban green spaces in the past 4 weeks.	53
	BEH2	I have been visiting / using urban green spaces regularly in the past 4 weeks.	54
	BEH3	I have been visiting / using urban green spaces often.	55

References

Aarts, H., Verplanken, B., & Van Knippenberg, A. (1997). Habit and information use in travel mode choices. *Acta Psychologica, 96*(1), 1-14.

Abrahamse, W., & Steg, L. (2013). Social influence approaches to encourage resource conservation: A meta-analysis. *Global environmental change, 23*(6), 1773-1785.

Abu-Ghazzeh, T. M. (1996). Reclaiming public space: the ecology of neighborhood open spaces in the town of Abu-Nuseir, Jordan. *Landscape and Urban planning, 36*(3), 197-216.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Ajzen, I. (2002a). Constructing a TPB Questionnaire: Conceptual and Methodological Considerations. *Working Paper, University of Massachusetts, Amherst*. http://people.umass.edu/aizen/pdf/tpb.measurement.pdf

Ajzen, I. (2002b). Residual effects of past on later behavior: Habituation and reasoned action perspectives. *Personality and social psychology review, 6*(2), 107-122.

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin, 84*(5), 888.

Ajzen, I., Heilbroner, R. L., Fishbein, M., & Thurow, L. C. (1980). *Understanding Attitudes and Predicting Social Behaviour*: Prentice Hall PTR.

Akter, S., D'Ambra, J., & Ray, P. (2011). An evaluation of PLS based complex models: the roles of power analysis, predictive relevance and GoF index. *AMCIS 2011 Proceedings-All Submissions*.

Appleton, J. (1984). Prospects and refuges re-visited. *Landscape Journal, 3*(2), 91-103.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British journal of social psychology, 40*(4), 471-499.

Atinc, G., Simmering, M. J., & Kroll, M. J. (2011). Control variable use and reporting in macro and micro management research. *Organizational Research Methods*, 1094428110397773.

Audit Commission. (2008). *Director of Audit's Report No.51*. The Government of Hong Kong Special Administrative Region Retrieved from http://www.aud.gov.hk/eng/pubpr_arpt/rpt_51.htm.

Badland, H. M., Schofield, G. M., & Garrett, N. (2008). Travel behavior and objectively measured urban design variables: associations for adults traveling to work. *Health & place, 14*(1), 85-95.

Baldwin, M. W. (1992). Relational schemas and the processing of social information. *Psychological Bulletin, 112*(3), 461.

Balram, S., & Dragićević, S. (2005). Attitudes toward urban green spaces: integrating questionnaire survey and collaborative GIS techniques to

improve attitude measurements. *Landscape and Urban planning, 71*(2), 147-162.

Bamberg, S., & Schmidt, P. (2003). Incentives, morality, or habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and Behavior, 35*(2), 264-285.

Bandura, A. (1989). Human agency in social cognitive theory. *American psychologist, 44*(9), 1175-1184.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology, 51*(6), 1173.

Bauman, A. E., Sallis, J. F., Dzewaltowski, D. A., & Owen, N. (2002). Toward a better understanding of the influences on physical activity: the role of determinants, correlates, causal variables, mediators, moderators, and confounders. *American journal of preventive medicine, 23*(2), 5-14.

Beck, L., & Ajzen, I. (1991). Predicting dishonest actions using the theory of planned behavior. *Journal of research in personality, 25*(3), 285-301.

Bedimo-Rung, A. L., Mowen, A. J., & Cohen, D. A. (2005). The significance of parks to physical activity and public health: a conceptual model. *American journal of preventive medicine, 28*(2), 159-168.

Berg, B. L., Lune, H., & Lune, H. (2004). *Qualitative research methods for the social sciences* (Vol. 5): Pearson Boston, MA.

Bish, A., Sutton, S., & Golombok, S. (2000). Predicting uptake of a routine cervical smear test: A comparison of the health belief model and the theory of planned behaviour. *Psychology and Health, 15*(1), 35-50.

Bixler, R. D., & Floyd, M. F. (1997). Nature is scary, disgusting, and uncomfortable. *Environment and Behavior, 29*(4), 443-467.

Björk, J., Albin, M., Grahn, P., Jacobsson, H., Ardö, J., Wadbro, J., . . . Skärbäck, E. (2008). Recreational values of the natural environment in relation to neighbourhood satisfaction, physical activity, obesity and wellbeing. *Journal of Epidemiology and Community Health, 62*(4), e2-e2.

Blumberg, S. J., Luke, J. V., & Cynamon, M. L. (2006). Telephone coverage and health survey estimates: evaluating the need for concern about wireless substitution. *American journal of public health, 96*(5), 926-931.

Bolund, P., & Hunhammar, S. (1999). Ecosystem services in urban areas. *Ecological economics, 29*(2), 293-301.

Bonaiuto, M., Fornara, F., & Bonnes, M. (2003). Indexes of perceived residential environment quality and neighbourhood attachment in urban environments: a confirmation study on the city of Rome. *Landscape and Urban planning, 65*(1), 41-52.

Bonnes, M., Passafaro, P., & Carrus, G. (2011). The ambivalence of attitudes toward urban green areas: Between proenvironmental worldviews and daily residential experience. *Environment and Behavior, 43*(2), 207-232.

Bratt, C. (1999). The impact of norms and assumed consequences on recycling behavior. *Environment and Behavior, 31*(5), 630-656.

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American psychologist, 32*(7), 513.

Brown, B. B., Perkins, D. D., & Brown, G. (2004). Incivilities, place attachment and crime: Block and individual effects. *Journal of Environmental Psychology, 24*(3), 359-371.

Burgess, J., Harrison, C. M., & Limb, M. (1988). People, parks and the urban green: a study of popular meanings and values for open spaces in the city. *Urban Studies, 25*(6), 455-473.

Burton, R. J. (2004). Reconceptualising the 'behavioural approach'in agricultural studies: a socio-psychological perspective. *Journal of Rural studies, 20*(3), 359-371.

Caldwell, L. L., & Darling, N. (1999). Leisure context, parental control, and resistance to peer pressure as predictors of adolescent partying and substance use: An ecological perspective. *Journal of Leisure Research, 31*(1), 57.

Cammock, P., Nilakant, V., & Dakin, S. (1995). Developing a lay model of managerial effectiveness: A social constructionist perspective. *Journal of Management Studies, 32*(4), 443-474.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*(2), 81.

Campbell, S. (1996). Green cities, growing cities, just cities?: Urban planning and the contradictions of sustainable development. *Journal of the American Planning Association, 62*(3), 296-312.

Carles, J., Bernáldez, F., & Lucio, J. d. (1992). Audio-visual interactions and soundscape preferences. *Landscape research, 17*(2), 52-56.

Carlson, K. D., & Wu, J. (2011). The illusion of statistical control: Control variable practice in management research. *Organizational Research Methods*, 1094428111428817.

Carpenter, C. J. (2010). A meta-analysis of the effectiveness of health belief model variables in predicting behavior. *Health communication, 25*(8), 661-669.

Carr, S. (1992). *Public space*: Cambridge University Press.

Carrus, G., Passafaro, P., & Bonnes, M. (2004). Environmentalism, ethnocentrism and authoritarianism: an attitude toward urban green scale. *Bollettino di Psicologia Applicata, 242*, 3-12.

Census and Statistics Department. (2011). *2011 Population Census*. Hong Kong: The Government of Hong Kong Special Adminstrative Region Retrieved from http://www.census2011.gov.hk/en/index.html.

Champion, V. L., & Skinner, C. S. (2008). The health belief model. *Health behavior and health education: Theory, research, and practice, 4*, 45-65.

Cheung, R., & Vogel, D. (2013). Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning. *Computers & Education, 63*, 160-175.

Chi, H., Yeh, H., & Hung, W.-c. (2012). The moderating effect of subjective norm on cloud computing users' perceived risk and usage intention. *International Journal of Marketing Studies, 4*(6), p95.

Chiesura, A. (2004). The role of urban parks for the sustainable city. *Landscape and Urban planning, 68*(1), 129-138.

Chin, W. W. (1998a). Commentary: Issues and opinion on structural equation modeling: JSTOR.

Chin, W. W. (1998b). The partial least squares approach to structural equation modeling. *Modern methods for business research, 295*(2), 295-336.

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual review of psychology, 55*, 591-621.

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. *Advances in experimental social psychology, 24*(20), 1-243.

Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance. In L. Gardner, G. Daniel, & S. T. Fiske (Eds.), *The Handbook of Social Psychology*: Oxford University Press.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*: L. Erlbaum Associates.

Coles, R., & Bussey, S. (2000). Urban forest landscapes in the UK—progressing the social agenda. *Landscape and Urban planning, 52*(2), 181-188.

Coley, R. L., Sullivan, W. C., & Kuo, F. E. (1997). Where does community grow? The social context created by nature in urban public housing. *Environment and Behavior, 29*(4), 468-494.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28*(15), 1429-1464.

Coshall, J. T. (2000). Measurement of tourists' images: The repertory grid approach. *Journal of Travel Research, 39*(1), 85-89.

Couper, M. P., Traugott, M. W., & Lamias, M. J. (2001). Web survey design and administration. *Public opinion quarterly, 65*(2), 230-253.

Craighead, C. W., Ketchen, D., Dunn, K. S., & Hult, G. (2011). Addressing common method variance: guidelines for survey research on information technology, operations, and supply chain management. *Engineering Management, IEEE Transactions on, 58*(3), 578-588.

Crane, R., & Weber, R. (2012). *The Oxford Handbook of Urban Planning*: OUP USA.

Cybriwsky, R. (1999). Changing patterns of urban public space: observations and assessments from the Tokyo and New York metropolitan areas. *Cities, 16*(4), 223-231.

Daniels, K., Johnson, G., & de Chernatony, L. (2002). Task and institutional influences on managers' mental models of competition. *Organization Studies, 23*(1), 31-62.

Davies, J., Foxall, G. R., & Pallister, J. (2002). Beyond the intention–behaviour mythology an integrated model of recycling. *Marketing theory, 2*(1), 29-113.

De Bruijn, G.-J., Kremers, S. P., De Vet, E., De Nooijer, J., Van Mechelen, W., & Brug, J. (2007). Does habit strength moderate the intention–behaviour

relationship in the Theory of Planned Behaviour? The case of fruit consumption. *Psychology and Health, 22*(8), 899-916.

De Vries, S., Verheij, R. A., Groenewegen, P. P., & Spreeuwenberg, P. (2003). Natural environments-healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environment and Planning A, 35*(10), 1717-1732.

Demographia. (2015). 11th Annual Demographia International Housing Affordability Survey: 2015.

Do Valle, P. O., Rebelo, E., Reis, E., & Menezes, J. (2005). Combining behavioral theories to predict recycling involvement. *Environment and Behavior, 37*(3), 364-396.

Dong, S., Xu, S. X., & Zhu, K. X. (2009). Research note-information technology in supply chains: the value of it-enabled resources under competition. *Information systems research, 20*(1), 18-32.

Ewing, R., & Handy, S. (2009). Measuring the unmeasurable: urban design qualities related to walkability. *Journal of Urban Design, 14*(1), 65-84.

Eyler, A. A., Brownson, R. C., Donatelle, R. J., King, A. C., Brown, D., & Sallis, J. F. (1999). Physical activity social support and middle-and older-aged minority women: results from a US survey. *Social science & medicine, 49*(6), 781-789.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods, 39*(2), 175-191.

Field, A., Miles, J., & Field, Z. (2012). *Discovering Statistics Using SPSS*: SAGE Publications.

Fishbein, M. (1979). A theory of reasoned action: some applications and implications. *Nebraska Symposium on Motivation, 27*, 65-116.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: an introduction to theory and research*: Addison-Wesley Pub. Co.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 39-50.

Francis, J., Giles-Corti, B., Wood, L., & Knuiman, M. (2012). Creating sense of community: The role of public space. *Journal of Environmental Psychology, 32*(4), 401-409.

Fransella, F., Bell, R., & Bannister, D. (2004). *A Manual for Repertory Grid Technique*: Wiley.

Fulton, J. P., Buechner, J. S., Scott, H. D., DeBuono, B. A., Feldman, J. P., Smith, R. A., & Kovenock, D. (1991). A study guided by the Health Belief Model of the predictors of breast cancer screening of women ages 40 and older. *Public Health Reports, 106*(4), 410.

Gagnon, M.-P., Godin, G., Gagné, C., Fortin, J.-P., Lamothe, L., Reinharz, D., & Cloutier, A. (2003). An adaptation of the theory of interpersonal behaviour to the study of telemedicine adoption by physicians. *International journal of medical informatics, 71*(2), 103-115.

Ganesan, S., & Lau, S. (2000). Urban challenges in Hong Kong: future directions for design. *Urban Design International, 5*(1), 3-12.

Gidlöf-Gunnarsson, A., & Öhrström, E. (2007). Noise and well-being in urban residential environments: The potential role of perceived availability to nearby green areas. *Landscape and Urban planning, 83*(2), 115-126.

Giles-Corti, B. (2006). People or places: what should be the target? *Journal of Science and Medicine in Sport, 9*(5), 357-366.

Giles-Corti, B., Broomhall, M. H., Knuiman, M., Collins, C., Douglas, K., Ng, K., . . . Donovan, R. J. (2005). Increasing walking: how important is distance to, attractiveness, and size of public open space? *American journal of preventive medicine, 28*(2), 169-176.

Giles-Corti, B., & Donovan, R. J. (2002). The relative influence of individual, social and physical environment determinants of physical activity. *Social science & medicine, 54*(12), 1793-1812.

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health behavior and health education: theory, research, and practice*: John Wiley & Sons.

Godin, G., & Kok, G. (1996). The theory of planned behavior: a review of its applications to health-related behaviors. *American Journal of Health Promotion, 11*(2), 87-98.

Godin, G., Valois, P., Lepage, L., & Desharnais, R. (1992). Predictors of smoking behaviour: an application of Ajzen's theory of planned behaviour. *British journal of addiction, 87*(9), 1335-1343.

Grahn, P. (1994). Green structures-The importance for health of nature areas and parks. *European Regional Planning, 56*, 89-112.

Grahn, P., & Stigsdotter, U. A. (2003). Landscape planning and stress. *Urban Forestry & Urban Greening, 2*(1), 1-18.

Grahn, P., & Stigsdotter, U. K. (2010). The relation between perceived sensory dimensions of urban green space and stress restoration. *Landscape and Urban planning, 94*(3), 264-275.

Grandcolas, U., Rettie, R., & Marusenko, K. (2003). Web survey bias: sample or mode effect? *Journal of Marketing Management, 19*(5-6), 541-561.

Grove, J., Troy, A., O'Neil-Dunne, J., Burch Jr, W., Cadenasso, M., & Pickett, S. (2006). Characterization of households and its implications for the vegetation of urban ecosystems. *Ecosystems, 9*(4), 578-597.

Groves, R. M., Biemer, P. P., Lyberg, L. E., Massey, J. T., Nicholls, W. L., & Waksberg, J. (2001). *Telephone Survey Methodology*: John Wiley & Sons.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2013). *Multivariate Data Analysis*: Pearson Education, Limited.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *The Journal of Marketing Theory and Practice, 19*(2), 139-152.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Editorial-partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Planning, 46*(1-2), 1-12.

Hall, P., & Tewdwr-Jones, M. (2010). *Urban and Regional Planning*: Taylor & Francis.

Hamilton, K., & White, K. M. (2008). Extending the theory of planned behavior: the role of self and social influences in predicting adolescent regular moderate-to-vigorous physical activity. *Journal of Sport & Exercise Psychology, 30*(1), 56-74.

Handy, S. (1996). Methodologies for exploring the link between urban form and travel behavior. *Transportation Research Part D: Transport and Environment, 1*(2), 151-165.

Handy, S., Boarnet, M., Ewing, R., & Killingsworth, R. (2002). How the built environment affects physical activity: views from urban planning. *American journal of preventive medicine, 23*(2), 64-73.

Harland, P., Staats, H., & Wilke, H. A. (1999). Explaining proenvironmental intention and behavior by personal norms and the theory of planned behavior. *Journal of Applied Social Psychology, 29*(12), 2505-2528.

Harman, H. H. (1976). *Modern Factor Analysis*: University of Chicago Press.

Harris, C. R., Jenkins, M., & Glaser, D. (2006). Gender differences in risk assessment: Why do women take fewer risks than men. *Judgment and Decision Making, 1*(1), 48-63.

Hartig, T., Mang, M., & Evans, G. W. (1991). Restorative effects of natural environment experiences. *Environment and Behavior, 23*(1), 3-26.

Heath, G. W., Brownson, R. C., Kruger, J., Miles, R., Powell, K. E., Ramsey, L. T., & Services, T. F. o. C. P. (2006). The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *Journal of Physical Activity & Health, 3*, S55.

Heath, Y., & Gifford, R. (2002). Extending the theory of planned behavior: predicting the use of public transportation. *Journal of Applied Social Psychology, 32*(10), 2154-2189.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of Partial Least Squares Path Modeling in International Marketing. *Advances in International Marketing, 20*, 277-319.

Henseler, J., & Sarstedt, M. (2013). Goodness-of-fit indices for partial least squares path modeling. *Computational Statistics, 28*(2), 565-580.

Hidalgo, M. C., & Hernandez, B. (2001). Place attachment: Conceptual and empirical questions. *Journal of Environmental Psychology, 21*(3), 273-281.

Hillsdon, M., Panter, J., Foster, C., & Jones, A. (2006). The relationship between access and quality of urban green space with population physical activity. *Public health, 120*(12), 1127-1132.

Hochbaum, G., Rosenstock, I., & Kegels, S. (1952). Health belief model. *United States Public Health Service*.

Holloway, J. C., & Taylor, N. (2006). *The business of tourism*: Pearson Education.

Holman, C., Donovan, R. J., & Corti, B. (1996). Factors influencing the use of physical activity facilities: results from qualitative research.

Home, R., Bauer, N., & Hunziker, M. (2010). Cultural and biological determinants in the evaluation of urban green spaces. *Environment and Behavior, 42*(4), 494-523.

Hong Kong Trade Development Council. (2013). *Telecommunications Industry in Hong Kong*. Hong Kong: Hong Kong Trade Development Council Retrieved from http://hong-kong-economy-research.hktdc.com/business-news/subindex/en/Hong-Kong-Industry-Profiles/1X47J8WG/1/0.htm.

Hopper, J. R., & Nielsen, J. M. (1991). Recycling as altruistic behavior normative and behavioral strategies to expand participation in a community recycling program. *Environment and Behavior, 23*(2), 195-220.

Horne, R., & Weinman, J. (1999). Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. *Journal of psychosomatic research, 47*(6), 555-567.

Hu, S. S., Balluz, L., Battaglia, M. P., & Frankel, M. R. (2011). Improving public health surveillance using a dual-frame survey of landline and cell phone numbers. *American Journal of Epidemiology, 173*(6), 703-711.

Huang, X., Wright, R. P., Chiu, W. C., & Wang, C. (2008). Relational schemas as sources of evaluation and misevaluation of leader–member exchanges: Some initial evidence. *The Leadership Quarterly, 19*(3), 266-282.

Hutcheson, G. D., & Sofroniou, N. (1999). *The Multivariate Social Scientist: Introductory Statistics Using Generalized Linear Models*: SAGE Publications.

Irvine, K. N., Warber, S. L., Devine-Wright, P., & Gaston, K. J. (2013). Understanding urban green space as a health resource: A qualitative comparison of visit motivation and derived effects among park users in Sheffield, UK. *International journal of environmental research and public health, 10*(1), 417-442.

Jabareen, Y. R. (2009). Building a conceptual framework: philosophy, definitions, and procedure. *International Journal of Qualitative Methods, 8*(4), 49-62.

Jackson, C., Smith, A., & Conner, M. (2003). Applying an extended version of the theory of planned behaviour to physical activity. *Journal of Sports Sciences, 21*(2), 119-133.

James, P., Tzoulas, K., Adams, M., Barber, A., Box, J., Breuste, J., . . . Thompson, C. (2009). Towards an integrated understanding of green space in the European built environment. *Urban Forestry & Urban Greening, 8*(2), 65-75.

Jankowicz, D. (2005). *The Easy Guide to Repertory Grids*: Wiley.

Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. *Health Education & Behavior, 11*(1), 1-47.

Jay, M., & Schraml, U. (2009). Understanding the role of urban forests for migrants–uses, perception and integrative potential. *Urban Forestry & Urban Greening, 8*(4), 283-294.

Jim, C. (1994). Urban renewal and environmental planning in Hong Kong. *Environmentalist, 14*(3), 163-181.

Jim, C., & Chen, W. Y. (2006). Perception and attitude of residents toward urban green spaces in Guangzhou (China). *Environmental management, 38*(3), 338-349.

Jim, C., & Shan, X. (2013). Socioeconomic effect on perception of urban green spaces in Guangzhou, China. *Cities, 31*, 123-131.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of mixed methods research, 1*(2), 112-133.

Jöreskog, K. G., & Sörbom, D. (1989). *LISREL 7: A guide to the program and applications*: Spss.

Jöreskog, K. G., & Wold, H. (1982). The ML and PLS techniques for modeling with latent variables: historical and comparative aspects. In K. G. Jöreskog & H. Wold (Eds.), *Systems Under Indirect Observation, Part 1* (pp. 263-270).

Kaczynski, A. T., Potwarka, L. R., & Saelens, B. E. (2008). Association of park size, distance, and features with physical activity in neighborhood parks. *American journal of public health, 98*(8), 1451.

Kaczynski, A. T., Potwarka, L. R., Smale, B. J., & Havitz, M. E. (2009). Association of parkland proximity with neighborhood and park-based physical activity: variations by gender and age. *Leisure sciences, 31*(2), 174-191.

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*: CUP Archive.

Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology, 15*(3), 169-182.

Kasl, S. V., & Cobb, S. (1966). Health behavior, illness behavior and sick role behavior. *Archives of Environmental Health: An International Journal, 12*(2), 246-266.

Keeter, S. (1995). Estimating telephone noncoverage bias with a telephone survey. *Public opinion quarterly, 59*(2), 196-217.

Kelly, G. (1955). *The Psychology of Personal Constructs: A theory of personality*: Routledge.

King, A. C., Blair, S. N., Bild, D. E., Dishman, R. K., Dubbert, P. M., Marcus, B. H., . . . Yeager, K. K. (1992). Determinants of physical activity and interventions in adults. *Medicine & Science in Sports & Exercise, 24*(6), S221-S236.

Kinoshita, H. (2001). The street market as an urban facility in Hong Kong *Public Places in Asia Pacific Cities* (pp. 71-86): Springer.

Knussen, C., & Yule, F. (2008). "I'm Not in the Habit of Recycling" The Role of Habitual Behavior in the Disposal of Household Waste. *Environment and Behavior, 40*(5), 683-702.

Kock, N. (2014). *One-tailed or two-tailed P values in PLS-SEM*. Laredo, TX: ScriptWarp Systems.

Kuo, F. E., Bacaicoa, M., & Sullivan, W. C. (1998). Transforming inner-city landscapes trees, sense of safety, and preference. *Environment and Behavior, 30*(1), 28-59.

Lafortezza, R., Carrus, G., Sanesi, G., & Davies, C. (2009). Benefits and well-being perceived by people visiting green spaces in periods of heat stress. *Urban Forestry & Urban Greening, 8*(2), 97-108.

LaGrange, R. L., & Ferraro, K. F. (1989). ASSESSING AGE AND GENDER DIFFERENCES IN PERCEIVED RISK AND FEAR OF CRIME*. *Criminology, 27*(4), 697-720.

Lam, K.-C. (2004). *Parks, people and the environment: A study of the environmental quality and visitor behavior in parks and open spaces in Hong Kong*: Centre for Environmental Policy and Resource Management, The Chinese University of Hong Kong.

Lam, K.-C., Ng, S.-L., Hui, W.-C., & Chan, P.-K. (2005). Environmental quality of urban parks and open spaces in Hong Kong. *Environmental monitoring and assessment, 111*(1-3), 55-73.

Lam, T., Baum, T., & Pine, R. (2003). Subjective norms: effects on job satisfaction. *Annals of Tourism Research, 30*(1), 160-177.

Latan, H., & Ghozali, I. (2012). Partial least Squares: Concept and application path modeling using program XLSTAT-PLS for empirical research, BP UNDIP.

Lau, S. (2015, 16 June). Hong Kong pollsters prefer to stick with landline phones for surveys, instead of mobile devices. *South China Morning Post*. Retrieved from http://www.scmp.com/news/hong-kong/politics/article/1822633/hong-kong-pollsters-prefer-stick-landline-phones-surveys

Law, L. (2002). Defying disappearance: cosmopolitan public spaces in Hong Kong. *Urban Studies, 39*(9), 1625-1645.

Lawton, L. J. (2005). Resident perceptions of tourist attractions on the Gold Coast of Australia. *Journal of Travel Research, 44*(2), 188-200.

Lee, A., & Maheswaran, R. (2011). The health benefits of urban green spaces: a review of the evidence. *Journal of Public Health, 33*(2), 212-222.

Lee, C., & Moudon, A. V. (2008). Neighbourhood design and physical activity. *Building research & information, 36*(5), 395-411.

Lee, M. K., Shi, N., Cheung, C. M., Lim, K. H., & Sia, C. L. (2011). Consumer's decision to shop online: The moderating role of positive informational social influence. *Information & Management, 48*(6), 185-191.

Leisure and Cultural Services Department. (2007). *Public Pleasure Grounds - Venues*. The Government of Hong Kong Special Adminstrative Region Retrieved from http://www.lcsd.gov.hk.

Leisure and Cultural Services Department. (2014). *Leisure and Cultural Services Department*. The Government of Hong Kong Special Administrative Region Retrieved from http://www.lcsd.gov.hk/en/ls_park.php.

Levin, J., Fox, J. A., & Forde, D. R. (2013). *Elementary Statistics in Social Research: International Edition*: Pearson Education, Limited.

Limayem, M., & Cheung, C. M. (2011). Predicting the continued use of Internet-based learning technologies: the role of habit. *Behaviour & Information Technology, 30*(1), 91-99.

Lindzey, G., Gilbert, D., & Fiske, S. T. (1998). *The handbook of social psychology*: Oxford University Press.

Liska, A. E. (1984). A critical examination of the causal structure of the Fishbein/Ajzen attitude-behavior model. *Social psychology quarterly*, 61-74.

Lo, A. Y., & Jim, C. (2010a). Differential community effects on perception and use of urban greenspaces. *Cities, 27*(6), 430-442.

Lo, A. Y., & Jim, C. (2010b). Willingness of residents to pay and motives for conservation of urban green spaces in the compact city of Hong Kong. *Urban Forestry & Urban Greening, 9*(2), 113-120.

Lo, A. Y., & Jim, C. (2012). Citizen attitude and expectation towards greenspace provision in compact urban milieu. *Land Use Policy, 29*(3), 577-586.

Lo, S., Yiu, C., & Lo, A. (2003). An analysis of attributes affecting urban open space design and their environmental implications. *Management of Environmental Quality: An International Journal, 14*(5), 604-614.

Lu, I. R., Kwan, E., Thomas, D. R., & Cedzynski, M. (2011). Two new methods for estimating structural equation models: An illustration and a comparison with two established methods. *International Journal of research in Marketing, 28*(3), 258-268.

Lukas, S. A. (2007). *The themed space: Locating culture, nation, and self*: Rowman & Littlefield.

Luttik, J. (2000). The value of trees, water and open space as reflected by house prices in the Netherlands. *Landscape and Urban planning, 48*(3), 161-167.

Luymes, D. T., & Tamminga, K. (1995). Integrating public safety and use into planning urban greenways. *Landscape and Urban planning, 33*(1), 391-400.

Lynch, K. (1984). *Good City Form*: MIT Press.

Maas, J., Van Dillen, S. M., Verheij, R. A., & Groenewegen, P. P. (2009). Social contacts as a possible mechanism behind the relation between green space and health. *Health & place, 15*(2), 586-595.

MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual review of psychology, 58*, 593.

Malhotra, N. K. (2012). *Basic Marketing Research: Integration of Social Media*: Pearson.

Malhotra, N. K., Kim, S. S., & Patil, A. (2006). Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research. *Management Science, 52*(12), 1865-1883.

Maruani, T., & Amit-Cohen, I. (2007). Open space planning models: A review of approaches and methods. *Landscape and Urban planning, 81*(1), 1-13.

Massey, J. T., O'Connor, D., & Krotki, K. (1997). *Response rates in random digit dialing (RDD) telephone surveys.* Paper presented at the Proceedings of the American Statistical Association, Section on Survey Research Methods.

Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information systems research, 2*(3), 173-191.

Maxwell, J. A. (2012). *Qualitative Research Design: An Interactive Approach: An Interactive Approach*: SAGE Publications.

Meade, A. W., Watson, A. M., & Kroustalis, C. M. (2007). *Assessing common methods bias in organizational research.* Paper presented at the 22nd annual meeting of the society for industrial and organizational psychology, New York.

Mega, V., & Pedersen, J. (1998). Urban sustainability indicators: European Foundation for the Improvement of Living and Working Conditions.

Messerschmidt, C. M., & Hinz, O. (2013). Explaining the adoption of grid computing: An integrated institutional theory and organizational capability approach. *The Journal of Strategic Information Systems, 22*(2), 137-156.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*: Sage.

Miller, G. A. (1956). The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychological review, 63*(2), 81.

Millington, C., Thompson, C. W., Rowe, D., Aspinall, P., Fitzsimons, C., Nelson, N., . . . Collaboration, S. t. S. P. A. R. (2009). Development of the Scottish walkability assessment tool (SWAT). *Health & place, 15*(2), 474-481.

Nasar, J. L., & Jones, K. M. (1997). Landscapes of fear and stress. *Environment and Behavior, 29*(3), 291-323.

Neuman, W. L. (2013). *Social Research Methods: Qualitative and Quantitative Approaches*: Pearson Education, Limited.

Neuvonen, M., Sievänen, T., Tönnes, S., & Koskela, T. (2007). Access to green areas and the frequency of visits–A case study in Helsinki. *Urban Forestry & Urban Greening, 6*(4), 235-247.

Nielsen, T. S., & Hansen, K. B. (2007). Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators. *Health & place, 13*(4), 839-850.

Nunnally, J. C. (1981). *Psychometric Theory*: McGraw-Hill.

Office of the Communications Authority. (2015). *Key Communications Statistics*. Hong Kong: The Government of Hong Kong Special Adminstrative Region Retrieved from http://www.ofca.gov.hk/en/media_focus/data_statistics/key_stat/.

Ohanian, R. (1990). Construction and validation of a scale to measure celebrity endorsers' perceived expertise, trustworthiness, and attractiveness. *Journal of advertising*, 39-52.

Olewiler, N. (2006). Environmental sustainability for urban areas: The role of natural capital indicators. *Cities, 23*(3), 184-195.

Olson, J. C., & Muderrisoglu, A. (1979). The stability of responses obtained by free elicitation: Implications for measuring attribute salience and memory structure. *Advances in consumer research, 6*(1), 269-275.

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: the multiple processes by which past behavior predicts future behavior. *Psychological Bulletin, 124*(1), 54.

Parker, D., Manstead, A. S., & Stradling, S. G. (1995). Extending the theory of planned behaviour: The role of personal norm. *British journal of social psychology, 34*(2), 127-138.

Parker, D., Manstead, A. S., Stradling, S. G., Reason, J. T., & Baxter, J. S. (1992). Intention to commit driving violations: an application of the theory of planned behavior. *Journal of applied psychology, 77*(1), 94.

Parsons, R., & Daniel, T. C. (2002). Good looking: in defense of scenic landscape aesthetics. *Landscape and Urban planning, 60*(1), 43-56.

Pavlou, P. A., Liang, H., & Xue, Y. (2006). Understanding and mitigating uncertainty in online environments: a principal-agent perspective. *Mis Quarterly, 31*(1), 105-136.

Payne, L. L., Mowen, A. J., & Orsega-Smith, E. (2002). An examination of park preferences and behaviors among urban residents: the role of residential location, race, and age. *Leisure sciences, 24*(2), 181-198.

Pham, D. T., Fortin, F., & Thibaudeau, M. F. (1996). The role of the health belief model in amputees' self-evaluation of adherence to diabetes self-care behaviors. *The Diabetes Educator, 22*(2), 126-132.

Phythian, G. J., & King, M. (1992). Developing an expert support system for tender enquiry evaluation: a case study. *European Journal of Operational Research, 56*(1), 15-29.

Pike, S. (2003). The use of repertory grid analysis to elicit salient short-break holiday destination attributes in New Zealand. *Journal of Travel Research, 41*(3), 315-319.

Planning Department. (2005). *Hong Kong Planning Standards and Guidelines*. Hong Kong: The Government of Hong Kong Special Adminstrative Region Retrieved from http://www.pland.gov.hk/pland_en/tech_doc/hkpsg/full/ch4/ch4_text.htm.

Planning Department. (2013). *Land Utilization in Hong Kong* The Government of Hong Kong Special Administrative Region: Retrieved from http://www.pland.gov.hk/pland_en/info_serv/statistic/landu.html.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology, 88*(5), 879.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of management, 12*(4), 531-544.

Potwarka, L. R., Kaczynski, A. T., & Flack, A. L. (2008). Places to play: association of park space and facilities with healthy weight status among children. *Journal of community health, 33*(5), 344-350.

Poudyal, N. C., Hodges, D. G., & Merrett, C. D. (2009). A hedonic analysis of the demand for and benefits of urban recreation parks. *Land Use Policy, 26*(4), 975-983.

Povey, R., Conner, M., Sparks, P., James, R., & Shepherd, R. (2000). Application of the Theory of Planned Behaviour to two dietary behaviours: Roles of perceived control and self-efficacy. *British Journal of Health Psychology, 5*(2), 121-139.

Prentice-Dunn, S., & Rogers, R. W. (1986). Protection motivation theory and preventive health: Beyond the health belief model. *Health education research, 1*(3), 153-161.

Quine, L., Rutter, D. R., & Arnold, L. (1998). Predicting and understanding safety helmet use among schoolboy cyclists: a comparison of the theory of planned behaviour and the health belief model. *Psychology and Health, 13*(2), 251-269.

Raymore, L. A. (2002). Facilitators to leisure. *Journal of Leisure Research, 34*(1), 37.

Reddy, P., & Caputi, P. (1999). A comparison of triadic and dyadic methods of personal construct elicitation. *Journal of Constructivist Psychology, 12*(3), 253-264.

Reger, R. K. (1990). The repertory grid technique for eliciting the content and structure of cognitive constructive systems (pp. 301-309): John Wiley & Sons Ltd., Chicester.

Reinartz, W., Haenlein, M., & Henseler, J. (2009). An empirical comparison of the efficacy of covariance-based and variance-based SEM. *International Journal of research in Marketing, 26*(4), 332-344.

Rhodes, R. E., Brown, S. G., & McIntyre, C. A. (2006). Integrating the perceived neighborhood environment and the theory of planned behavior when predicting walking in a Canadian adult sample. *American Journal of Health Promotion, 21*(2), 110-118.

Richardson, E. A., Pearce, J., Mitchell, R., & Kingham, S. (2013). Role of physical activity in the relationship between urban green space and health. *Public health, 127*(4), 318-324.

Rietveld, P., & Wagtendonk, A. J. (2004). The location of new residential areas and the preservation of open space: experiences in the Netherlands. *Environment and Planning A, 36*(11), 2047-2064.

Ringle, C. M., Wende, S., & Will, S. (2005). SmartPLS 2.0 (M3) Beta, Hamburg.

Rönkkö, M., & Ylitalo, J. (2011). PLS marker variable approach to diagnosing and controlling for method variance. *ICIS 2011 Proceedings*, Paper 8.

Roovers, P., Hermy, M., & Gulinck, H. (2002). Visitor profile, perceptions and expectations in forests from a gradient of increasing urbanisation in central Belgium. *Landscape and Urban planning, 59*(3), 129-145.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1994). The health belief model and HIV risk behavior change *Preventing AIDS* (pp. 5-24): Springer.

Saelens, B. E., Sallis, J. F., Black, J. B., & Chen, D. (2003). Neighborhood-based differences in physical activity: an environment scale evaluation. *American journal of public health, 93*(9), 1552-1558.

Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annu. Rev. Public Health, 27*, 297-322.

Sallis, J. F., Owen, N., & Fisher, E. B. (2008). Ecological models of health behavior. *Health behavior and health education: Theory, research, and practice, 4*, 465-486.

Sanesi, G., & Chiarello, F. (2006). Residents and urban green spaces: the case of Bari. *Urban Forestry & Urban Greening, 4*(3), 125-134.

Sarstedt, M., Henseler, J., & Ringle, C. M. (2011). Multigroup analysis in partial least squares (PLS) path modeling: Alternative methods and empirical results. *Advances in International Marketing, 22*(1), 195-218.

Schiffman, L. G., Kanuk, L. L., & Wisenblit, J. (2010). *Consumer Behavior*: Pearson Prentice Hall.

Schipperijn, J., Bentsen, P., Troelsen, J., Toftager, M., & Stigsdotter, U. K. (2013). Associations between physical activity and characteristics of urban green space. *Urban Forestry & Urban Greening, 12*(1), 109-116.

Schipperijn, J., Ekholm, O., Stigsdotter, U. K., Toftager, M., Bentsen, P., Kamper-Jørgensen, F., & Randrup, T. B. (2010). Factors influencing the

use of green space: Results from a Danish national representative survey. *Landscape and Urban planning, 95*(3), 130-137.

Schipperijn, J., Stigsdotter, U. K., Randrup, T. B., & Troelsen, J. (2010). Influences on the use of urban green space–A case study in Odense, Denmark. *Urban Forestry & Urban Greening, 9*(1), 25-32.

Schroeder, H. W., & Anderson, L. (1984). Perception of personal safety in urban recreation sites. *Journal of Leisure Research, 16*(2), 178-194.

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological science, 18*(5), 429-434.

Schwartz, S. H. (1977). Normative influences on altruism. *Advances in experimental social psychology, 10*, 221-279.

Scott, M. M., Evenson, K. R., Cohen, D. A., & Cox, C. E. (2007). Comparing perceived and objectively measured access to recreational facilities as predictors of physical activity in adolescent girls. *Journal of Urban Health, 84*(3), 346-359.

Sewell, W. H. (1989). Some reflections on the golden age of interdisciplinary social psychology. *Social psychology quarterly*, 88-97.

Shan, X.-Z. (2014). Socio-demographic variation in motives for visiting urban green spaces in a large Chinese city. *Habitat International, 41*, 114-120.

Shen, L.-Y., Ochoa, J. J., Shah, M. N., & Zhang, X. (2011). The application of urban sustainability indicators–A comparison between various practices. *Habitat International, 35*(1), 17-29.

Shen, Q., Chen, Q., Tang, B.-s., Yeung, S., Hu, Y., & Cheung, G. (2009). A system dynamics model for the sustainable land use planning and development. *Habitat International, 33*(1), 15-25.

Shih, Y.-Y., & Fang, K. (2004). The use of a decomposed theory of planned behavior to study Internet banking in Taiwan. *Internet Research, 14*(3), 213-223.

Sidique, S. F., Lupi, F., & Joshi, S. V. (2010). The effects of behavior and attitudes on drop-off recycling activities. *Resources, Conservation and Recycling, 54*(3), 163-170.

Simpson, P. (2011). Street performance and the city: Public space, sociality, and intervening in the everyday. *Space and Culture, 14*(4), 415-430.

Şimşekoğlu, Ö., & Lajunen, T. (2008). Social psychology of seat belt use: A comparison of theory of planned behavior and health belief model. *Transportation Research Part F: Traffic Psychology and Behaviour, 11*(3), 181-191.

Steg, L., Van den Berg, A. E., & De Groot, J. I. (2012). *Environmental psychology: An introduction*: John Wiley & Sons.

Stern, P. C. (1992). Psychological dimensions of global environmental change. *Annual review of psychology, 43*(1), 269-302.

Stern, P. C., Dietz, T., & Guagnano, G. A. (1995). The new ecological paradigm in social-psychological context. *Environment and Behavior, 27*(6), 723-743.

Sugiyama, T., Leslie, E., Giles-Corti, B., & Owen, N. (2008). Associations of neighbourhood greenness with physical and mental health: do walking,

social coherence and local social interaction explain the relationships? *Journal of Epidemiology and Community Health, 62*(5), e9-e9.

Sugiyama, T., Leslie, E., Giles-Corti, B., & Owen, N. (2009). Physical activity for recreation or exercise on neighbourhood streets: associations with perceived environmental attributes. *Health & place, 15*(4), 1058-1063.

Sugiyama, T., & Thompson, C. W. (2007). Older people's health, outdoor activity and supportiveness of neighbourhood environments. *Landscape and Urban planning, 83*(2), 168-175.

Sugiyama, T., Thompson, C. W., & Alves, S. (2009). Associations between neighborhood open space attributes and quality of life for older people in Britain. *Environment and Behavior, 41*(1), 3-21.

Sung, J. J., Choi, S. Y., Chan, F. K., Ching, J. Y., Lau, J. T., & Griffiths, S. (2008). Obstacles to colorectal cancer screening in Chinese: a study based on the health belief model. *The American journal of gastroenterology, 103*(4), 974-981.

Swanwick, C., Dunnett, N., & Woolley, H. (2003). Nature, role and value of green space in towns and cities: An overview. *Built Environment, 29*(2), 94-106.

Tan, F. B., & Hunter, M. G. (2002). The repertory grid technique: A method for the study of cognition in information systems. *Mis Quarterly*, 39-57.

Tan, P. Y., Wang, J., & Sia, A. (2013). Perspectives on five decades of the urban greening of Singapore. *Cities, 32*, 24-32.

Tang, B.-s., & Wong, S.-w. (2008). A longitudinal study of open space zoning and development in Hong Kong. *Landscape and Urban planning, 87*(4), 258-268.

Tang, B.-s., Wong, S.-w., & Lee, A. K.-w. (2007). Green belt in a compact city: A zone for conservation or transition? *Landscape and Urban planning, 79*(3), 358-373.

Tenenhaus, M., Vinzi, V. E., Chatelin, Y.-M., & Lauro, C. (2005). PLS path modeling. *Computational statistics & data analysis, 48*(1), 159-205.

Thøgersen, J. (1996). Recycling and morality a critical review of the literature. *Environment and Behavior, 28*(4), 536-558.

Thompson, C. W. (2002). Urban open space in the 21st century. *Landscape and Urban planning, 60*(2), 59-72.

Thompson, C. W. (2013). Activity, exercise and the planning and design of outdoor spaces. *Journal of Environmental Psychology, 34*, 79-96.

Tian, Y., Jim, C., & Tao, Y. (2012). Challenges and strategies for greening the compact city of Hong Kong. *Journal of Urban Planning and Development, 138*(2), 101-109.

Tobler, C., Visschers, V. H., & Siegrist, M. (2012). Addressing climate change: Determinants of consumers' willingness to act and to support policy measures. *Journal of Environmental Psychology, 32*(3), 197-207.

Tonglet, M., Phillips, P. S., & Read, A. D. (2004). Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: a case study from Brixworth, UK. *Resources, Conservation and Recycling, 41*(3), 191-214.

Trafimow, D., Sheeran, P., Conner, M., & Finlay, K. A. (2002). Evidence that perceived behavioural control is a multidimensional construct: Perceived control and perceived difficulty. *British journal of social psychology, 41*(1), 101-121.

Transport and Housing Bureau. (2014). *Legislative Council Panel on Housing: Housing-related Initiatives in the 2014 Policy Address and Policy Agenda*. The Government of Hong Kong Special Administrative Region Retrieved from Legislative Council Panel on Housing: Housing-related Initiatives in the 2014 Policy Address and Policy Agenda.

Triandis, H. C. (1980). *Values, attitudes, and interpersonal behavior.* Paper presented at the Nebraska symposium on motivation 1979.

Tyrväinen, L. (2001). Economic valuation of urban forest benefits in Finland. *Journal of Environmental Management, 62*(1), 75-92.

Ulrich, R. S. (1981). Natural versus urban scenes some psychophysiological effects. *Environment and Behavior, 13*(5), 523-556.

Ulrich, R. S. (1983). Aesthetic and affective response to natural environment *Behavior and the natural environment* (pp. 85-125): Springer.

United Nations - Habitat. (2012). *Enhancing Urban Safety and Security: Global Report on Human Settlements 2007*: Taylor & Francis.

United States Environmental Protection Agency. (2013). *Green Communities - Indicators*. United States: Retrieved from http://www.epa.gov/greenkit/indicator.htm.

Van den Berg, A. E., Maas, J., Verheij, R. A., & Groenewegen, P. P. (2010). Green space as a buffer between stressful life events and health. *Social science & medicine, 70*(8), 1203-1210.

Van den Berg, A. E., & Ter Heijne, M. (2005). Fear versus fascination: An exploration of emotional responses to natural threats. *Journal of Environmental Psychology, 25*(3), 261-272.

Van Herzele, A., & Wiedemann, T. (2003). A monitoring tool for the provision of accessible and attractive urban green spaces. *Landscape and Urban planning, 63*(2), 109-126.

Verplanken, B., Aarts, H., & Van Knippenberg, A. (1997). Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology, 27*(5), 539-560.

Verplanken, B., Aarts, H., Van Knippenberg, A., & Moonen, A. (1998). Habit versus planned behaviour: A field experiment. *The British Journal of Social Psychology, 37*, 111.

Wallston, B. S., Alagna, S. W., DeVellis, B. M., & DeVellis, R. F. (1983). Social support and physical health. *Health psychology, 2*(4), 367.

Wan, C., Shen, G. Q., & Yu, A. (2014). The role of perceived effectiveness of policy measures in predicting recycling behaviour in Hong Kong. *Resources Conservation and Recycling, 83*, 141-151.

Wang, D., Brown, G., Liu, Y., & Mateo-Babiano, I. (2015). A comparison of perceived and geographic access to predict urban park use. *Cities, 42*, 85-96.

Whyte, W. H. (2001). *The Social Life of Small Urban Spaces*: Project for Public Spaces.

Wong, K. K. (2009). Urban park visiting habits and leisure activities of residents in Hong Kong, China. *Managing Leisure, 14*(2), 125-140.

Wong, K. K., & Cheung, P. W. (1999). Strategic theming in theme park marketing. *Journal of Vacation Marketing, 5*(4), 319-332.

Wong, K. K., & Domroes, M. (2005). The visual quality of urban park scenes of Kowloon Park, Hong Kong: likeability, affective appraisal, and cross-cultural perspectives. *Environment and Planning B: Planning and Design, 32*(4), 617-632.

Wright, R. P. (2008). Eliciting cognitions of strategizing using advanced repertory grids in a world constructed and reconstructed. *Organizational Research Methods, 11*(4), 753-769.

Wu, J., Wang, M., Li, W., Peng, J., & Huang, L. (2014). Impact of urban green space on residential housing prices: Case study in Shenzhen. *Journal of Urban Planning and Development*.

Xue, C. Q., Manuel, K. K., & Chung, R. H. (2001). Public space in the old derelict city area–a case study of Mong Kok, Hong Kong. *Urban Design International, 6*(1), 15-31.

Yang, W., & Kang, J. (2005). Soundscape and sound preferences in urban squares: a case study in Sheffield. *Journal of Urban Design, 10*(1), 61-80.

Ye, S. (1998). The land resource and landuse of Hong Kong. *Chinese Geographical Science, 8*(1), 12-24.

Ylitalo, J. (2009). Controlling for common method variance with partial least squares path modeling: A Monte Carlo study. *Research project, Helsinki University of Technology*.

Zhong, Y., & Lai, F. (2001). The problem of greenness system in garden city construction—A case study of Nanchang. *Environment and Exploitation, 16*(4), 46-48.

Zhou, X., & Parves Rana, M. (2012). Social benefits of urban green space: A conceptual framework of valuation and accessibility measurements. *Management of Environmental Quality: An International Journal, 23*(2), 173-189.