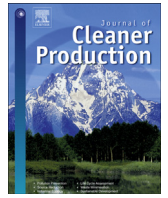




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The impact of socio-demographic, environmental, and individual factors on urban park visitation in Beijing, China

Hongxiao Liu ^a, Feng Li ^{a,*}, Lianfang Xu ^b, Baolong Han ^a

^a State Key Laboratory of Urban and Regional Ecology, Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences, Shuangqing Road 18, Haidian District, Beijing 100085, China

^b College of Hydrology and Water Resources, Hohai University, Xikang Road 1, Nanjing 210098, China

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ABSTRACT

Urban parks improve quality of life by providing an array of cultural and natural ecosystem services, such as maintaining biodiversity, reducing air pollution, and benefiting residents' physical and mental states. Although government invests a large amount of capital into park management, parks are still underused in many cases. In this study, the association and relative importance of socio-demographic, environmental, and individual factors were investigated with regards to their impact on citizens' park visitation. Data was collected through cross-sectional door-to-door questionnaires and online databases, and was analyzed using a hierarchical regression model. Results showed that physical exercise (27.4% of collected reports) and rest and relaxation (26.7%) were the two most widespread reasons for park use. When asked about constraints of park visitation, time limitations were reported as being the most constraining factor. However, our quantitative analysis found no significant correlation. Socio-demographic, environmental, and individual variables explained 1%, 20% and 26% (adjusted R^2) of the total variance in frequency of park visitation between participants, respectively. A citizen's neighborhood greenspace, housing price, and distance from the nearest park were negatively correlated with park use. Among individual factors, a participant's reported affinity for park visits, time spent in their residential greenspace, and number of children under seven were positively correlated with park visitation, with a decreasing β coefficient. This research highlights the predominant contribution of attitude over accessibility factors when it comes to park visitation. Furthermore, the data indicates that accessibility factors function differently for frequent, infrequent, and moderate park users and provision with parks within 1000 m of their home is recommended. The findings have implications for park management and future research.

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1. Introduction

Rapid urbanization poses a major challenge to the ecological and existing urban landscape, with 50% of the global population already concentrated in urban areas (UN, 2010; WHO, 2012). Urban life is characterized by a lack of access to nature, a sedentary life style, obesity, various chronic diseases, and social problems (Klaus et al., 2009; Miller, 2005; Pyle, 1978; Tian et al., 2014). Accumulating evidence shows that urban parks provide an array of social, natural, and cultural services, and may be regarded as an important remedy to combat the above-mentioned urban ailments (Gavin et al., 2010; Konijnendijk et al., 2013; Karin et al., 2010). However, cities are

relatively nature-poor, and parks require huge municipal investment that might otherwise be used for other development (Dino et al., 2013). In spite of large government investment in park construction and maintenance, urban parks are still underused in many cases (Dino et al., 2013). In Victoria, Australia, 40% of residents never use parks (Anon, 2004). Research on two parks in Guangzhou reported that 22% and 51% of the population around the respective parks never visited (Huang and Xu, 2013). The promotion of park use, given the competition for land use, is a major concern for municipal governments, urban planners, and urban ecology scholars. Identifying and providing scientific information on the primary determinants of park visitation could be of great assistance in devising programs and policies to promote park visitation.

Constraint on park visitation is a longstanding topic of interest in leisure constraint research, the aim of which is to mitigate engagement constraints and promote participation in leisure

* Corresponding author.

E-mail addresses: michellewinter@126.com (H. Liu), lifeng@rcees.ac.cn (F. Li).

activities. A body of researches have been published on the topic in *Leisure Sciences*, *Journal of Leisure Research*, *Journal of Park and Recreation Administration*, and other journals. Findings indicate that perceived time scarcity and preoccupation with other activities and household obligations are the most widespread constraints. Park overdevelopment, costs, and poor accessibility have been cited as being the least important constraints, while interventions that have improved park visitation have included increasing park safety, providing more information about parks, providing more park activities, and building parks closer to home. Studies have also examined how demographic differences and organizational interventions have affected the level of perceived constraints versus actual constraints over time (Dino et al., 2013; Andrew, 2005).

The fields of built environment and public health are paying increasing attention to park visitation and particularly to active park use, due to the accumulating evidence that urban parks encourage physical activity and interaction with nature, and thus provide mental and physical health benefits (Zhang, 2014). A conceptual model has been developed which organizes the factors influencing park visitation into three categories: intrapersonal factors (psychological factors internal to the individual, such as lack of interest or fear of crime or attack); interpersonal factors (interactions dependent on others, such as the presence of a companion to visit with); and structural factors (environmental factors such as the proximity of facilities or available leisure time) (Ariane et al., 2005). Using this model, it has been found that older adults, racial or ethnic minorities, females, and lower-income families were more likely to be infrequent or nonusers of parks (Cordell et al., 1999; Mowen et al., 2005; Payne et al., 2002; Scott and Munson, 1994; Scott and Jackson, 1996). It has also been found that interpersonal factors, such as park use by friends and family, are significantly associated with park use (Amy et al., 2009; Donna, 2000). Environmental factors have been well documented, ranging from park characteristics to neighborhood characteristics like walkability, population density, road connectivity, and traffic speed (Amy et al., 2009; Gavin et al., 2010; Mecredy et al., 2011; Sandra et al., 2014), and recent studies have highlighted the significant contribution of psychological factors (Joshua et al., 2013; Lin et al., 2014).

Park visitation research has received attention since 1980 in North America and Australia, but urban resident recreation research is quite limited in China, which is contradictory considering the increasing need for recreation space and refuge from a crowded, polluted, and stressful urban life. As Zhang and Yang (2014) have pointed out, “less developed countries face the challenge of meeting the rising demand for outdoor recreation opportunities in metropolitan areas. It is important to understand the developing process of outdoor recreation and identify the influencing factors in order to overcome the challenge. Literature on managing outdoor recreation in metropolitan areas in less developed countries is very limited.” Although existing leisure and public health studies provide valuable insights for urban planning in China, social and cultural differences may restrict their application. Thus original research is still required.

Beijing is typical of rapidly urbanized and urbanizing areas, where the conflict between economic development and environmental conservation is severe. That is why we chose to conduct our case study there, investigating Beijing park use and its influencing factors. Actually, there has been plenty of researches on urban parks in Beijing published in Chinese journals. However, broader studies have mainly focused on the classification, structure, emerging patterns, dynamics and accessibility of Beijing's parks by analyzing the properties of the parks themselves. Data on citizens' actual use of the parks and their requirements have not been included in these studies (Liu et al., 2013; Zhu and Feng, 2008). Government

consideration of park aesthetics overlooks the requirements of the resident in urban planning and park design (Gao, 2007; Zhang and Yang, 2014). In other studies that restricted themselves to individual parks, residents' behavior and characteristics were surveyed (e.g. preferred facilities and frequent activities) in order to guide park design, but most of this research is qualitative analysis and represents a statistical description of park use constraints (Gao, 2007; Li et al., 2012; Ren et al., 2011; Tan, 2006). To what extent these factors are correlated with actual visitation behavior is not quantified. In addition, a snapshot method of observation which is often used in previous studies – the POE (Post Occupation Evaluation) method, for example – is biased, because the opinion of park nonusers is not addressed. Comprehensive consideration of both the parks' and residents' characteristics in their socio-economic context is needed. Therefore, this study attempts to answer the following questions: (1) What is the overall usage of the parks in urban Beijing? (2) What are the motivations and impediments affecting citizens' park visitation? (3) What is the respective import of the socio-demographic, environmental, and individual factors that impact park visitation?

2. Method

2.1. Overview of urban parks in Beijing

Beijing has undergone significant economic development and rapid urban expansion over the past 30 years. The number of permanent residents in the city has increased by 3.8% per year over the past 10 years, reaching 19.612 million in 2010. Population density has reached 7837 people per km², exceeding the population density of metropolises like Tokyo and Greater London (BMBS, 2011). In 2013, the amount of park area in Beijing reached 22,215 ha, or 15.7 m² per capita (BMBS, 2013). The proportion of greenspace in Beijing in 2006 was 46.2%, and parks accounted for 55.4% of that total greenspace (Gao, 2006). Private greenspace is still relatively rare in Beijing; thus the provision of greenspace ecosystem services depends mainly on public parks (Yao et al., 2014).

2.2. Experiment design and data collection

A cross-sectional, door-to-door survey was conducted around North 5th Ring Road (shown in Fig. 1), where previously protected forests had been converted into several urban parks prior to the Olympic Games in 2008. The study area was encircled by the G45-S32 Road, Subway Line 13-G7 Road and the 4th Ring Road. Since the purpose of this study was to test the influence of certain specific factors on park visitation, variability outside the experimentally controlled variables was minimized by conducting the survey in settings that were similar in many aspects. A better picture might have emerged if the surveys were conducted across the entire city, but it was beyond the time and expenditure limitations of this experiment, and so the study area includes various types of parks in an attempt to represent the general situation in Beijing. Parks in this area include: Olympic Forestry Park, Chaolai Forestry Park, Lishui Bridge Park, Huangcaowan Country Park, Yongshiyong Country Park, Qinghe Country Park, Bishuifenghe Country Park, Dongshengbajia Country Park, Yanqing Cultural and Sports Park, Chaolai Agricultural Park, Dongxiaokou Forestry Park, Xisanqi Green Beach Park, Yongtai Ecological Park, Yangshan Park, and Beichen Central Park.

The door-to-door survey method with a questionnaire was used because a growing body of researches have documented insufficient coverage of the young and the poor using traditional surveying techniques such as the random calling of landline telephones (Delnevo et al., 2007), while an internet survey would lead

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