

Examining the economic impact of park facilities on neighboring residential property values



I-Hui Lin^a, Changshan Wu^{a,*}, Christopher De Sousa^b

^a Department of Geography, University of Wisconsin-Milwaukee, P.O. Box 413, Milwaukee, WI 53201, USA

^b School of Urban and Regional Planning, Ryerson University, 350 Victoria St., Toronto, Ontario M5B 2K3, Canada

ABSTRACT

Keywords:
Hedonic pricing
Parks
Park facilities
Property values

The economic impacts of parks on adjacent property values have been extensively studied in the literature. Studies on how individual park facilities influence property values, however, are rarely found. While park facilities are essential for providing diverse recreational opportunities, their economic impacts should also be considered when designing a park system. This study, therefore, applied hedonic regression models to examine the impacts of park facilities on neighboring residential property values within the city of Minneapolis, Minnesota, United States. The park facilities examined are divided into two categories: passive (i.e. passive recreation space, water features, and gardens) and active (i.e. children's play grounds, ball fields, tennis courts, skate park, etc.). Analysis of results suggests that park facilities for passive recreation, with the exception of urban gardens, are likely to have positive impacts on property values. Active facilities, especially skate parks and children's play areas, tend to introduce negative impacts. The impacts of facilities on property values decrease over distance zones from parks, which is consistent with the findings in the literature. Moreover, the impacts of facilities on property values vary with size, as gardens and most active facilities are more likely to be beneficial in small parks, while water features in large parks tend to increase property values.

© 2013 Elsevier Ltd. All rights reserved.

Introduction

Conservationists, urbanists, and the general public often consider parks as essential for contributing an array of social, economic, and environmental benefits to urban areas (Brabyn & Sutton, 2013; Chalkias et al., 2013; Gatrell & Jensen, 2002; Jim & Chen, 2009; Sherer, 2006). Economic benefits in particular have been viewed not only as a benefit for local economy, but also as a crucial determinant in the decision to invest in park space (Arvanitidis, Lalenis, Petrakos, & Psycharis, 2009; Cohen et al., 2007; Crompton, 1999, 2001a; Fox, 1990; Pine, 2009; Sherer, 2006; Smallwood, 1993; Taylor & Kuo, 2006; Taylor, Wiley, Kuo, & Sullivan, 1998). Among a variety of economic benefits associated with urban parks (e.g., attracting tourists and businesses/jobs, enhancing real estate values/tax base, stimulating urban revitalization), their positive impacts on proximate residential property values have proven to be significant and important on supporting park development and maintenance (Crompton, 2001b, 2005).

* Corresponding author. Tel.: +1 414 229 4860; fax: +1 414 229 3981.

E-mail addresses: ihuilin@uwm.edu (I.-H. Lin), cswu@uwm.edu, wuchangshan@gmail.com (C. Wu), chris.desousa@ryerson.ca (C. De Sousa).

According to the “proximate principle”, home owners are likely to pay more for proximity to certain amenities such as urban parks. Therefore, the values of residential properties located within a certain distance from urban parks are likely to be higher, and such an effect would diminish as the distance from parks increases (Crompton, 2005). Evidence of the positive impact of parks on surrounding property values can be found as far back as the late 1800s in the United States and European countries and are also supported by many recent studies (Crompton, 2001b, 2005; Danzer, 1987; Woolley, 2003). The increment of property values is then suggested to enhance property tax revenue and retirement of bonds used for parkland purchases and developments, and therefore reduce the burden of and help justify investment in park development (Crompton, 2001b; Fox, 1990; Hagerty, Stevens, Allen, & More, 1982; Kitchen & Hendon, 1967; More, Stevens, & Allen, 1988).

Evidence from empirical studies suggests that the strongest impact of urban parks is usually found within 183 m (600 ft), although significant impacts can be discerned up to 610 m (2000 ft) or more (Coughlin & Kawashima, 1973; Crompton, 2001b, 2005; Espey & Owusu-Edusei, 2001; Hagerty et al., 1982; Hammer, Coughlin, & Horn, 1974). To quantitatively examine positive

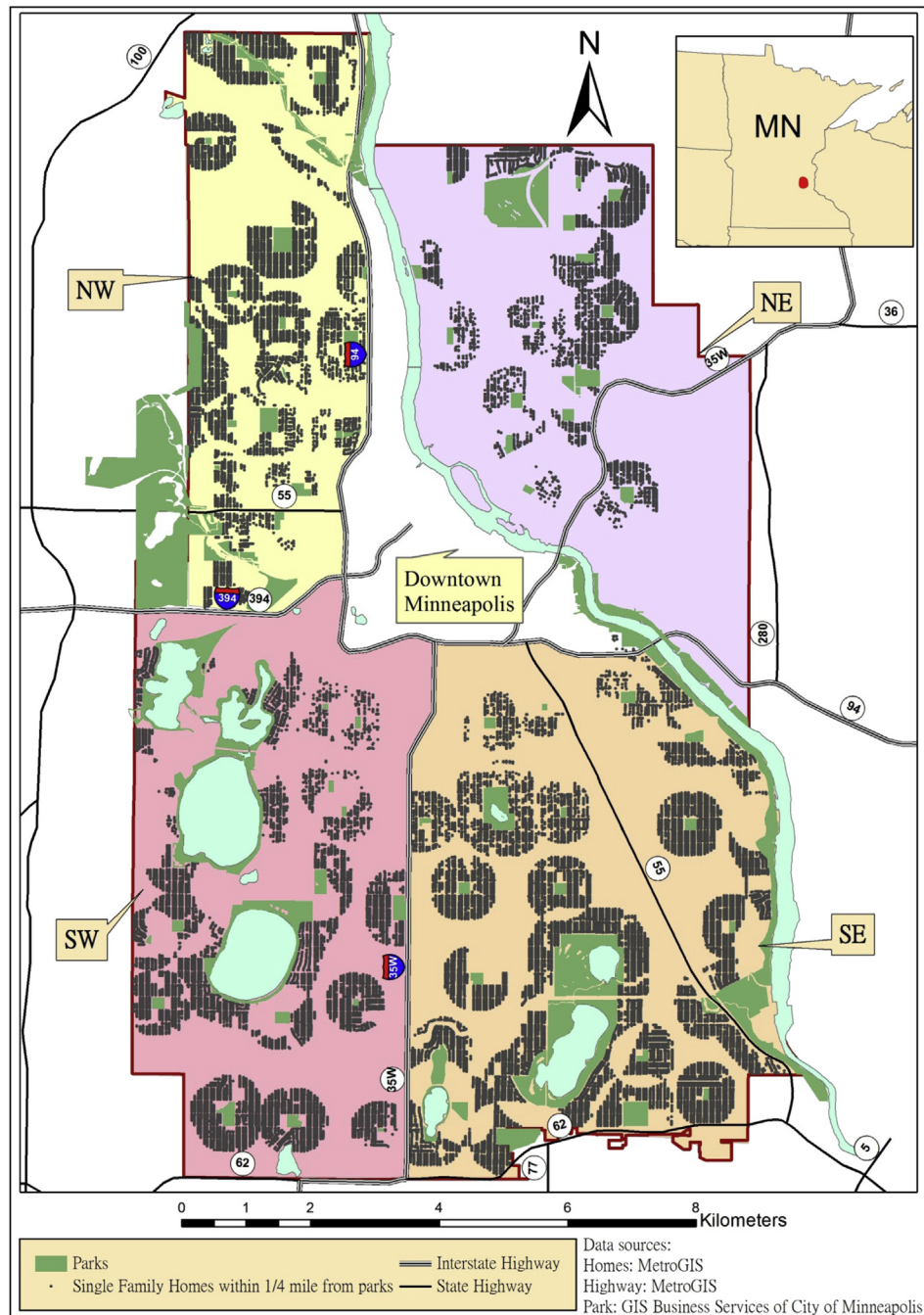


Fig. 1. Study area.

externalities (e.g., accessibility to nature, pleasing context, aesthetic view, and recreation opportunities) and negative externalities (e.g., noise and congestion from park activities and users) introduced by parks, scholars have incorporated park characteristics into hedonic models for analyzing park impacts on property values (Crompton, 2001b, 2005). Park characteristics employed in these models include attractiveness (Espey & Owusu-Edusei, 2001), overall design (passive and active) (Lutzenhiser & Netusil, 2001), types of primary usage (e.g., cemetery, golf course, community garden, greenways) (Bolitzer & Netusil, 2000; Crompton & Nicholls, 2006; Lutzenhiser & Netusil, 2001; Voicu & Been, 2008), and types of ownership (public and private) (Bolitzer & Netusil, 2000).

The literature mostly suggests that parks constructed primarily for passive recreational uses are more likely to have strong and positive impacts, while parks intensively used for active recreational purposes have relatively weak or negative impacts (Bolitzer & Netusil, 2000; Crompton, 2004; Hammer et al., 1974; More et al., 1988; Weicher & Zerbst, 1973). The negative impact associated with proximity to active parks is somewhat more complicated however, because those residing a short distance from the park may benefit from it, while those living next door may be disturbed by noise, heavy use, parking, and a variety of other factors (Crompton, 2004; Kovacs, 2012). In addition, given that park size varies and may range from less than 1 acre to over a hundred acres, different effects for parks with different sizes can be assumed. Scholars have

Table 1
Statistics for parks.

	N of parks	Mean park size km ² (acres)	SD km ² (acres)	Minimum km ² (acres)	Maximum km ² (acres)
All parks	76	0.242 (59.72)	0.571 (141.06)	0.005 (1.15)	2.996 (740.29)
Urban park	15	1.064 (262.8)	0.897 (221.55)	0.209 (51.56)	2.996 (740.29)
Community park	18	0.084 (20.69)	0.041 (10.19)	0.040 (10.00)	0.183 (45.16)
Neighborhood park	43	0.021 (5.22)	0.010 (2.59)	0.005 (1.15)	0.037 (9.23)

found that park size can be an important factor that is positively related to proximate property values (Bolitzer & Netusil, 2000). By combining parks' size and attractiveness, Espey and Owusu-Edusei (2001) found that "attractive" parks, both in small and medium sizes, have positive impacts on property values but the impact of small parks is particularly large. Basic parks of small and medium size with fewer amenities and less attractive features, on the other hand, have negative impacts on property values, with the negative effect of medium parks being relatively higher.

Beyond the parks' overall design, however, further information on the impact of specific park facilities is lacking. This study extends the existing literature by incorporating individual park facilities into the analysis. Three questions were asked in this study, including 1) how do individual park facilities affect the values of proximate residential properties?; 2) what are the magnitude and geographic scale of such effect?; and 3) How do individual park facilities in different sized parks affect the values of proximate properties?. Given that local governments are often under intense pressure to provide diverse recreation opportunities to residents, it is important to have a better understanding of the nature and scope of any potential impact that these facilities may have on surrounding property values. A better understanding of this issue can also suggest measures for enhancing positive and mitigating negative implications through better design, planning, and programming by those involved in park planning and development.

Material and methods

Study area and data

We selected the city of Minneapolis, MN, United States as the study area (Fig. 1). Minneapolis is often touted as having one of the best park systems in the United States, with park acreage per 1000 residents of 15.3 in 2010 (The Center for City Park Excellence, 2010), much higher than the national standard (10.0) set by the National Recreation and Park Association (NRPA). Seventy-six parks were chosen in Minneapolis with sizes ranging from one to over one hundred acres. Further, these parks were based on the design standard of the Minneapolis Park and Recreation Board and the National Recreation and Park Association (Mertes & Hall, 1995) into three groups: neighborhood parks (0.004–0.040 km²/1–10 acres), community parks (0.040–0.202 km²/10–50 acres), and urban parks (over 0.202 km²/50 acres) respectively (Table 1).

Given that property values and demographic compositions vary across the city, four sectors (northeast (NE), northwest (NW), southeast (SE), and southwest (SW)) divided by the highway system and the Mississippi River, were analyzed separately in this study. The four sectors are considered four sub-markets in Minneapolis (Wu & Sharma, 2012). Moreover, we excluded the downtown area from the analysis due to the limited number of single family properties. The average property values in 2009 of these four sectors vary significantly (Table 2). The average value of single family properties in the SW sector (\$396,223) is significantly higher, for instance, than the average for the city (\$230,772), while

the average values in the other three sectors are below the city average, with the NW having the lowest average property value (\$125,963). Population compositions also vary from sector to sector (Fig. 2). In SW, almost all of the studied blocks are inhabited by non-Hispanic White population. In NW, on the other hand, many blocks are inhabited by non-Hispanic African American population, and a couple of blocks have more than 10 percent Asian population. In the remaining two sectors, non-Hispanic White population is the majority, mixed with non-Hispanic African American and Hispanic populations, particularly in the center of the NE and the northwest portion of the SE quadrant.

In order to examine the impacts of park facilities on property values, a park influence area needs to be pre-defined. In this study, the park influence radius was defined as a quarter mile (402 m/1320 ft) from a park. This is equivalent to the acceptable walking distance and in the range of the commonly suggested maximum influence radius (457 m/1500 ft) and the minimum influence distance (183 m/600 ft) suggested in the literature (Murray, 2001). All single family residential properties located within the park influence area were selected, but those within the influence area of two or more parks were removed to avoid the impacts from multiple parks. As a result, 35,280 single family residential properties were employed for further analyses. The 2009 estimated market values (EMVs) of selected residential properties were obtained from the MetroGIS database and summarized in Table 2. We used EMVs instead of property transaction values in this research for two reasons. First, the EMVs in Minneapolis are frequently estimated and adjusted through the analyses of property sales. Second, the purpose of this study is to find out how park facilities impact the values of properties, and therefore affect tax revenue that can support park investment. Thereby, the use of EMVs instead of the actual transaction values is considered more appropriate in this study.

To examine the impacts of park facilities on neighboring residential property values, property, neighborhood, and park facility attributes were included in the hedonic regression analyses. The selected property attributes (see Table 3) were obtained from the MetroGIS database and the Assessor's Office. Neighborhood attributes were obtained from the MetroGIS database and 2010 Census. In order to investigate the impact of different park facilities on property values, a number of park facilities were identified using

Table 2
Descriptive statistics of 2009 estimated market values (EMVs) of single family houses within the park influence area.

Sector	No. of single family houses	Mean (US \$)	Standard deviation (US \$)	Min (US \$)	Max (US \$)
All	35,280	230,772	184,756	20,000	3,825,000
NE	4212	184,901	40,711	47,500	596,000
NW	7934	125,963	46,311	20,000	625,000
SE	14,774	206,508	74,692	45,000	1,173,700
SW	8360	396,233	302,356	70,000	3,825,000

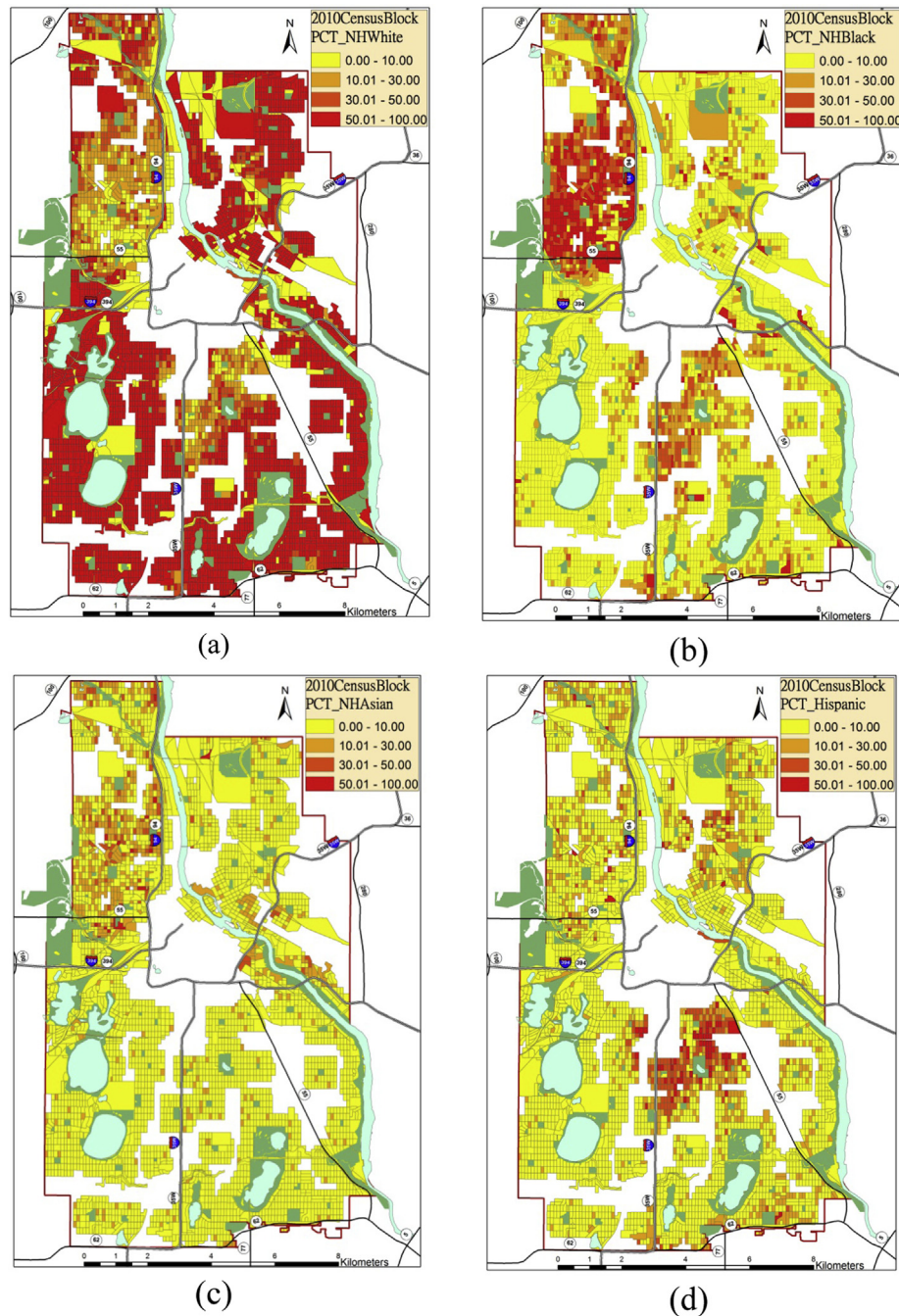


Fig. 2. Population distributions by race/ethnicity.

asset documents obtained from the Minneapolis Park and Recreation Board (MPRB) and the publication of MPRB properties (Smith, 2008), and via Google Map. The selected park facilities, including passive and active facilities, are listed in Table 3.

Methodology

As suggested in the literature, property values are closely associated with housing structural, neighborhood, and park related attributes and can be modeled as a hedonic function of these attributes as follow:

$$V_i = f(H_i, N_i, P_i) \quad (1)$$

where V_i is the EMV of property i , H_i is a vector of housing structural attributes (e.g. lot area, total number of rooms, number of bathrooms, etc.) of property i , N_i is a vector of neighborhood attributes excluding parks, and P_i is a vector of park facility attributes. In this study, we adopted a semi-log model (V_i is natural logarithm transformed) to examine the relationship between property values and park facility attributes. With this model, the estimated coefficients represent the percent change in the property values associated with one unit change of the attributes.

To answer the three research questions about the impacts of park facilities, three sets of hedonic models were constructed. First, to examine the impacts of diverse park facilities on the values of properties within the park influence area, we constructed one city-

Table 3
Explanatory variables of hedonic regression models.

Housing structural attributes	Lotsf	Lot area (square footage)
	Garage	Number of garage stalls
	Rmstot	Total number of rooms
	Fbathtot	Total number of full bathrooms
	Build_Age	Number of years since the unit was built
Neighborhood attributes	DBus_ft	Direct distance to the nearest bus stop (in feet)
	DHWay_ft	Direct distance to the nearest major highways (in feet)
	DPark	Direct distance to the nearest park (in feet)
	PctB	Percent of non-Hispanic African American population (2010) of the census block group
	PctA	Percent of non-Hispanic Asian population (2010) of the census block group
	PctH	Percent of Hispanic population (2010) of the census block group
Park facilities (passive)	PctPassive	Percent of passive recreation space in the park (e.g. spaces for walking, picking, site seeing and people watching, and etc.)
	Water	Presence of water body (e.g. river, creek, and lake) in the park
	Garden	Presence of garden in the park
Park facilities (active)	NDiamond	Number of diamond fields (e.g. softball and baseball) in the park
	NField	Number of ball fields (e.g. football and soccer) in the park
	NBasketball	Number of basketball court in the park
	NTennis	Number of tennis court in the park
	NVolleyball	Number of volleyball court in the park
	SkateP	Presence of skate park in the park
	Winter	Presence of winter recreation (e.g. ice rink and cross-country skiing trail) in the park
	Indoor	Presence of indoor facility (e.g. craft room, meeting room, and gymnasium) in the park
	Play	Presence of children's play area in the park (playground and wedding pool)

level model including all single family houses within 402 m (1320 ft) of any park. Given that the average property values and demographic composition of the city were distributed unevenly, four sector-level models, each representing the sub-markets of NW, NE, SW, and SE, were constructed with the same approach but applied to individual sectors to examine the impacts of park facilities on property values specifically for each sector.

The second set of models was constructed to examine the impacts of park facilities on property values over distance. The park influence area (a radius of 402 m/1320 ft) was divided into four distance zones with 101 m (330 ft) (a typical residential block in Minneapolis) each. For each distance zone, a city-level hedonic model was constructed to examine the impacts of park facilities within that zone. As a result, four city-level hedonic models were built, one for each distance zone. The same approach was applied to build sector-level models, and with sixteen sector-level models were constructed in total.

The final set of models was developed to examine whether the impacts of park facilities on nearby property values changed among different park size levels. Here, parks were divided into three size levels: neighborhood parks (0.004–0.040 km²/1–10 acres), community parks (0.040–0.202 km²/10–50 acres), and urban parks (over 0.202 km²/50 acres). Each hedonic model was built to examine the impacts of a particular size of park. As an example, the impact of neighborhood parks was evaluated independently through analyzing all the residential properties within the neighborhood parks' influence areas. To implement this, three city-level models (e.g. neighborhood parks, community parks, and urban parks) were constructed. Similarly, twelve sector-level models were developed subsequently.

All the above hedonic models were estimated using ordinary least squares regressions and analyzed using SPSS software. Multicollinearity was identified using Variance Inflation Factor (VIF), and independent variables with high VIFs were dropped from the models.

Results

Impacts of park facilities on proximate residential property values

With the first set of models, the impacts of park facilities on the values of properties located within the park influence area were

examined. Specifically, the city-level model was built to examine the overall impacts of park facilities on property values, and four sector-level models were developed to examine variations among sectors. The estimated coefficients for housing structure and neighborhood variables are presented in Table 4 and those for park facility variables are reported in Table 5. The results from the city-level model and four sector-level models suggest that newly constructed properties with larger lot square footage, more garage stalls, more rooms, and more full bathrooms have higher values. Three distance variables had significant but very small impacts on property values in the defined park influence area in all models. Three demographic variables (i.e., percent of African American population, percent of Asian population, and percent of Hispanic population) had significant but slightly negative impacts on property values.

Table 5 suggests that passive facilities are likely to bring positive impacts, while active facilities tend to be associated with insignificant or negative impacts. A detailed examination of the results, however, reveals that the type of individual recreational facilities, either passive or active, have significantly different impacts on neighboring property values. For passive facilities, the presence of a water body has a significantly positive impact on neighboring residential property values (e.g., 6.4 percent increase at the city level, and 19.8 percent increase in SW). Moreover, the percent of passive recreation areas in parks was also positively related to property values but with very weak magnitudes. Interestingly, the valuation impacts of gardens in parks were mixed. At the city level, the presence of gardens has a negative impact (6.0 percent decrease) on neighboring property values. At the sector level, the impact of gardens was negative in SW (13.2 percent decrease), insignificant in NW and SE, and positive in NE (6.6 percent increase).

Active facilities were generally associated with negative impacts on adjacent property values. In particular, skate parks and children's play areas were the two active facilities negatively impacting neighboring property values in both city-level and sector-level models. However, not all active facilities consistently reduced average adjacent property values. Winter recreation centers were positively related to property values in both city- and sector-level

Table 4

Estimated coefficients for the structural and neighborhood variables.

	City β (SE ^a)	NE β (SE)	NW β (SE)	SE β (SE)	SW β (SE)
(Constant)	11.619*** (0.013)	11.528*** (0.032)	11.186*** (0.030)	11.546*** (0.014)	11.561*** (0.020)
Lotsf	4.072E–5*** (0.000)	2.185E–5*** (0.000)	1.493E–5*** (0.000)	4.057E–5*** (0.000)	4.336E–5*** (0.000)
Garage	0.043*** (0.002)	0.044*** (0.003)	0.074*** (0.004)	0.048*** (0.002)	0.035*** (0.003)
Rmstot	0.118*** (0.001)	0.069*** (0.002)	0.085*** (0.002)	0.087*** (0.001)	0.107*** (0.001)
FBathtot	0.069*** (0.004)	0.046*** (0.007)	0.056*** (0.008)	0.037*** (0.004)	0.043*** (0.005)
Build_Age	–0.001*** (0.000)	–0.001*** (0.000)	–0.003*** (0.000)	–0.003*** (0.000)	–0.001*** (0.000)
DBus_ft	–3.149E–6 (0.000)	3.201E–6 (0.000)	2.426E–5*** (0.000)	7.959E–5*** (0.000)	0.000*** (0.000)
DHWay_ft	1.701E–5*** (0.000)	–5.760E–6*** (0.000)	–3.935E–6*** (0.000)	1.483E–5*** (0.000)	4.800E–5*** (0.000)
DPark	–2.697E–5*** (0.000)	1.457E–5** (0.000)	1.266E–5** (0.000)	–5.746E–5*** (0.000)	–7.161E–5*** (0.000)
PctB	–0.010*** (0.000)	–0.003*** (0.000)	–0.004*** (0.000)	–0.003*** (0.000)	–0.005*** (0.000)
PctA	–0.009*** (0.000)	1.442E–5 (0.001)	–0.005*** (0.000)	–0.002*** (0.000)	0.000 (0.001)
PctH	–0.007*** (0.000)	–0.002*** (0.000)	–0.005*** (0.000)	–0.005*** (0.000)	–0.004*** (0.000)

*, **, and *** Denote significance at 90%, 95%, and 99% level, respectively.

Dependent variable: Ln_EMV

Adjusted R square: city: 0.736; NE: 0.524; NW: 0.520; SE: 0.700; SW: 0.832.

^a SE = standard error.**Table 5**

Modeling coefficients for individual park facilities at the city-level and sector-level in Minneapolis, MN, U.S.A.

		City β (SE ^a)	NE β (SE)	NW β (SE)	SE β (SE)	SW β (SE)
Park facilities (passive)	PctPassive	– ^b	0.001*** (0.000)	0.001*** (0.000)	–	–
	Water	0.064*** (0.004)	–0.006 (0.014)	–	0.023*** (0.005)	0.198*** (0.011)
	Garden	–0.060*** (0.004)	0.066*** (0.008)	–	0.004 (0.005)	–0.132*** (0.006)
Park facilities (active)	NDiamond	–0.007*** (0.001)	–	–	0.007*** (0.001)	–0.029*** (0.002)
	NField	0.026*** (0.002)	–0.023*** (0.002)	0.081*** (0.005)	0.003** (0.002)	–
	NBasketball	–0.040*** (0.003)	0.085*** (0.009)	0.037*** (0.010)	0.025*** (0.004)	–
	NTennis	–	–	0.013*** (0.003)	–	–0.014*** (0.002)
	NVolleyball	–0.023*** (0.004)	–	0.019 (0.013)	0.182*** (0.006)	–0.058*** (0.012)
	SkateP	–0.136*** (0.005)	–0.009 (0.014)	–0.053*** (0.014)	–0.013** (0.006)	–
	Winter	0.033*** (0.004)	0.109*** (0.009)	0.047** (0.007)	–	0.004 (0.010)
	Indoor	0.080*** (0.004)	0.013 (0.009)	–0.201*** (0.012)	–0.009* (0.005)	–
	Play	–0.359*** (0.007)	–0.155*** (0.020)	NA ^c	–0.082*** (0.009)	–0.075*** (0.008)

*, **, and *** Denote significance at 90%, 95%, and 99% level, respectively.

Dependent variable: Ln_EMV.

^a SE = standard error.^b Variable was dropped due to high VIF.^c N/A: not identified in the parks or identified in all parks.

models, but the effects were small in magnitude or failed to reach statistical significance. Other active facilities showed inconsistent impacts to property values in all models. These active facilities mostly introduced positive impacts to property values in the NW and SE, and negative property value impacts in the other sectors. Although our data cannot explain this phenomenon, one possible explanation for future study is that residents from different economic and/or cultural backgrounds may value park amenities differently and are therefore, more favorable to the positives and tolerant of the negatives of proximity. Even though a positive effect can be suggested, however, the predicted magnitude is small. Results also suggest that most of the positive effects of active facilities were less than a 9 percent increase in average property value except for the volleyball courts in SE (18.2 percent increase). One exception is indoor recreation centers, which had negative impacts on nearby property values in NW and SE.

Impacts of park facilities over distance zones

The second set of models was developed to examine the effect of park facilities in each of the four successive 101-m distance zones from parks, and results are illustrated in Figs. 3–5 respectively.

Among passive facilities (see Fig. 3), water features remained strongly and positively related to property values. A strong positive impact of water features can be found in the first zone, especially in SW (34.9 percent), and, as expected, the magnitude of the positive effect decreased in outer zones. The other two passive facilities, percent of passive space and gardens, however, had relatively small changes over distance zones. The percentage of passive space in parks had a positive but small impact on property values over distances. The impacts of gardens remained mixed over distance. For the entire city and the SW sector, gardens were negatively related to property values over distances. In addition, although gardens were positively related to property values in NE, the impact in the first zone was insignificant.

Figs. 4 and 5 show that, in general, negative externalities associated with active facilities decline with increasing distance from the park. Specifically, negative impacts of skate parks and children's play areas are highest in the first zone, and then reduced in outer zones. As an example, at the city level, the average value of a property located within 101 m from skate parks and children's play areas decreases approximately 20 percent and 40 percent respectively. An exception, however, was found in SE where skate parks only had a very weak impact on property values over distance

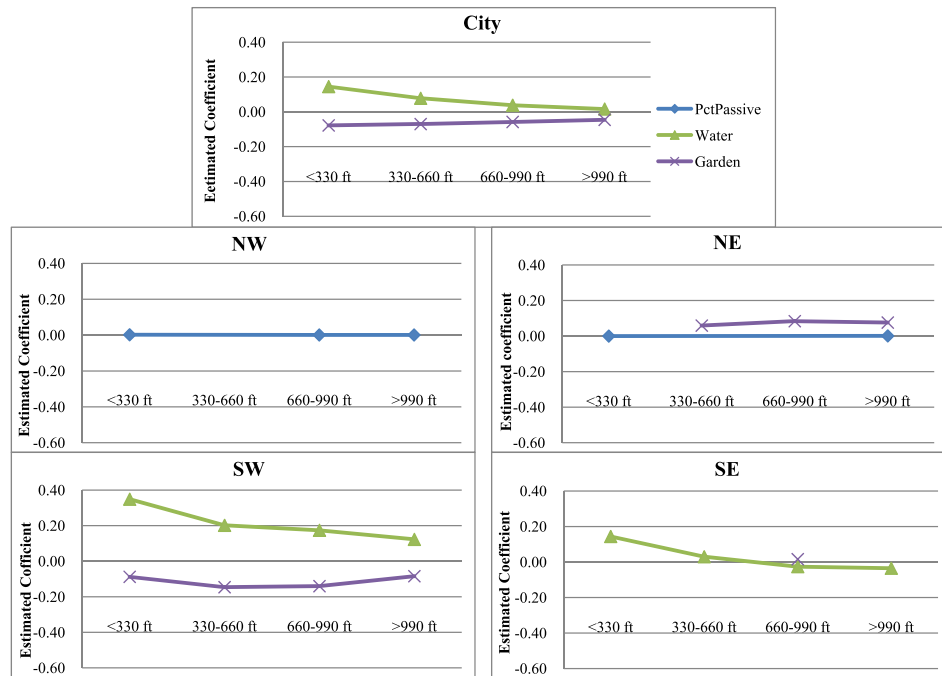


Fig. 3. Impacts of passive facilities on the property values over distance zones.

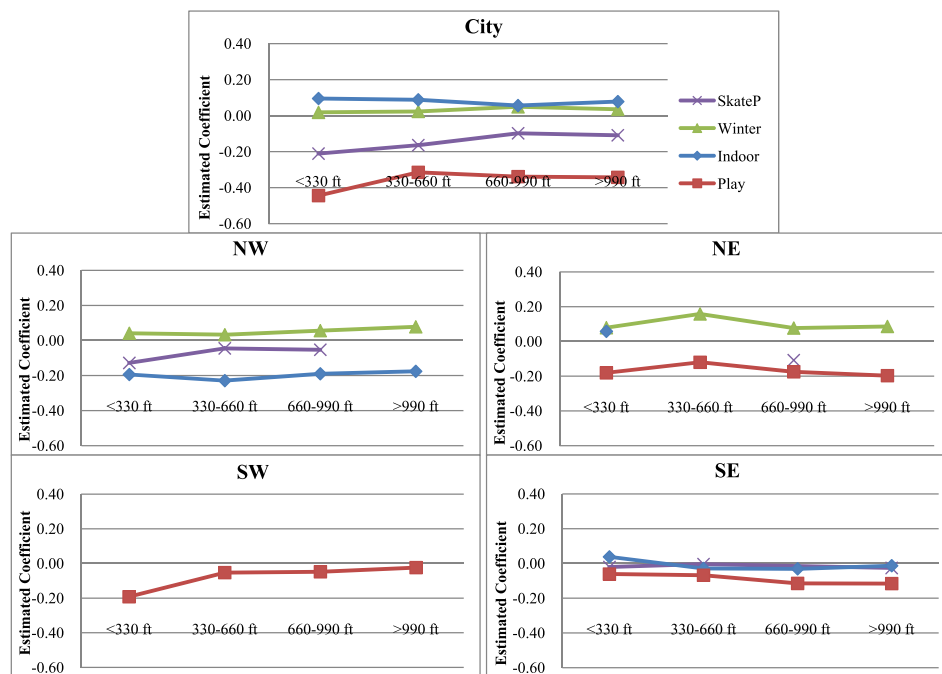


Fig. 4. Impacts of active facilities (I) on the property values over distance zones.

zones, and children's play areas only had a small negative effect in the first two zones from parks. The most consistent results over the city-level and sector-level models were for the winter recreation facilities. Winter recreation had a weak positive effect in the first zone, and its positive impact increased with distance. For other active facilities (see Fig. 5), the changes of impacts over distance zones were mostly minor. Exceptions, however, were found in NW and SE where positive effects of ball fields, basketball courts, and volleyball courts diminished in outer zones.

Impacts of park facilities by park sizes

With the third set of hedonic models, we examined whether park sizes play a role in the impacts of park facilities on neighboring property values, and results are illustrated in Fig. 6. Results suggest that among passive facilities only the presence of water features and of gardens produced noticeable variations across park size levels, while the effect of passive space was negligible. In large urban parks, water features were significantly and positively

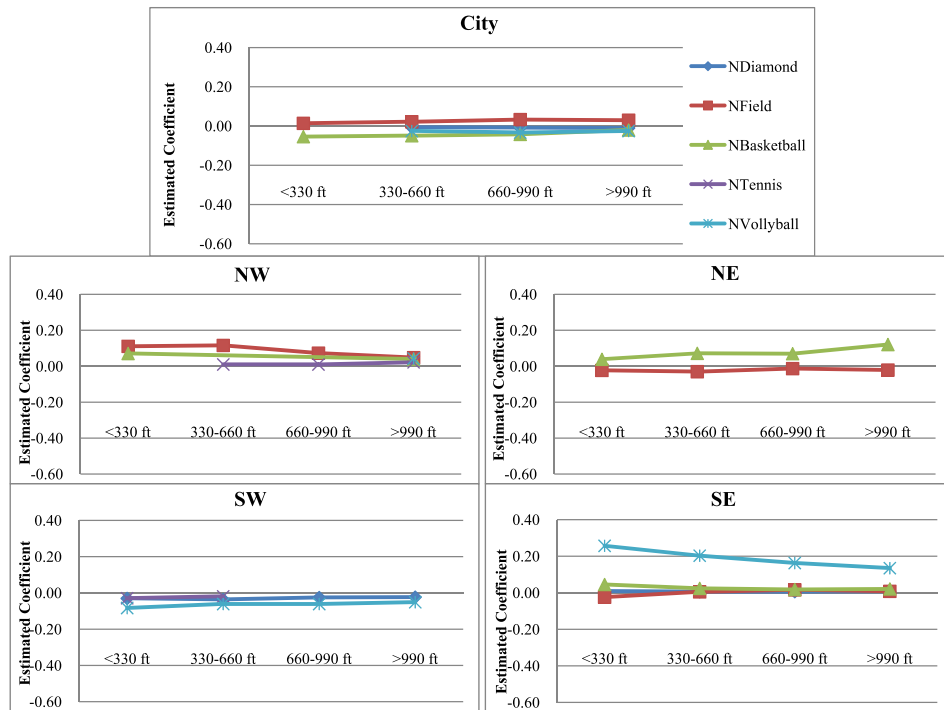


Fig. 5. Impacts of active facilities (II) on the property values over distance zones.

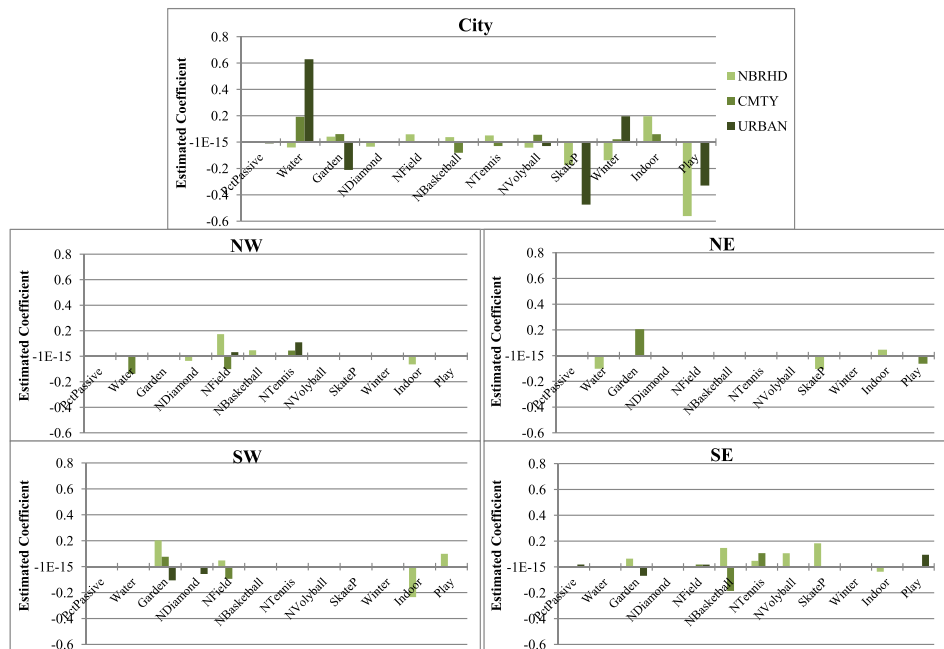


Fig. 6. Impact of park facilities on property values by park size levels.

related to property values, and the estimated values of such properties could be over 60 percent higher. Water features in median-sized community parks were also positively related to property values, but with relatively smaller magnitude (approximately 20 percent increase). The positive effect of water features disappeared, however, when located in small neighborhood parks. Gardens showed opposite results. Gardens were negatively related to property values when found in large urban parks but were

positively related to property values when situated in community parks and neighborhood parks.

Comparatively, most active facilities were more likely to have positive impacts on property values when located in small neighborhood parks. This appeared with ball fields (NW and SW), basketball courts (City and SE), tennis (City), and indoor facilities (City), while their effects decreased or became negative in larger parks. Skate parks, on the other hand, were negatively related to

property values in both small and large parks, but results also suggested that the negative impact of skate parks in neighborhood parks was smaller when compared to large parks. However, not all active facilities tended to be more beneficial in small parks. Winter recreation amenities in small neighborhood parks were negatively related to property values, while they were positively related to property values in large parks. Children's play areas were another example; play areas were negatively related to property values in both small and large parks, but the negative impact was much larger in small parks. Additionally, ball diamonds were negatively related to property values, and the negative effect was slightly larger in small parks.

Discussion

While the literatures generally suggests that parks primarily offering passive recreation tend to have strong and positive impacts on proximate property values when compared to parks offering active recreation, the characteristics of individual park facilities also may have specific impacts. As a result, the general guideline does not appear universally applicable, and the recreation type of individual facilities, either active or passive, also should be considered.

Water features in this study have been identified as the most promising park facilities benefiting neighboring property values. The impact of water features in SW is much higher in magnitude when compared to other sectors, and their effect in NE is insignificant. It appears that the size of water features plays an important role in the study area. Water features in parks identified in SW are mostly large lakes; four out of five were over hundred acres in size and part of the Chain of Lakes. Lake views may result in higher property values, especially for houses with direct frontage. Reserving a large park on a large water body can be difficult in an urban setting, but park planners should take the impact of large water body into consideration, especially when the park development is likely to enhance the city's tax base. In contrast, Marshall Terrace Park in the NE sector is bordered by the Mississippi River, but the riverfront has not yet been developed, and the water is not visible from the nearest buildings. This may explain why an insignificant effect was found in NE. Indeed, a project to reclaim the riverfront along Marshall Terrace Park was at an early stage when the study was being conducted, and it is anticipated that future access to the river will result in a positive effect. Our results lend economic support to ongoing efforts by the city to reclaim green space and promote green infrastructure along the Mississippi River and other large water bodies throughout Minneapolis.

As suggested in the literature, heavily used active parks are more likely to be associated with negative externalities such as noise and congestion. Gardens in this study area, when heavily used, also seem to suffer from negative externalities. Gardens in the two southern sectors, including the Lyndale Park gardens and the Longfellow garden, were described by the MPRB as popular gardens attracting visitors from the entire city of Minneapolis and served not only as an aesthetic landscape but also a space for social events such as weddings. Therefore, negative or insignificant impacts of gardens in these two sectors may be due to the negative externality generated by large groups of outside visitors. Some gardens themselves do nonetheless appear to benefit neighboring property values (Voicu & Been, 2008), as found in this study when they were located in neighborhood and community parks and primarily utilized by local residents.

When negative externalities such as noise and congestion can be expected, the impact of passive facilities (i.e., gardens) was found to be similar to those of active facilities (e.g., skate park and children's play area in this study) and may not provide benefits to neighboring property values. While the removal of these facilities

to benefit the housing market may not be feasible, park planners might be able to find ways to reduce the impact of negative externalities, such as employing landscape treatments to screen out disturbance (More et al., 1988).

Consistent with the results from the literature, active facilities were more likely to introduce negative externalities to adjacent properties, especially to those closest to the parks. Specifically, skate parks and children's play areas were consistently introducing negative impacts to adjacent property values in all areas. A concern may be that playground areas are predicted to exert strong negative impacts (35.9 percent decrease) on nearby property values with the city-level model, while the magnitude of the negative effects was reduced significantly in sub-sector models. Since most of the parks without children's play areas were located in the two southern sectors, especially in the SW which had much higher average property values, results from the city-level model may be misleading by the influence of average property values. Therefore, the negative impact of children's play areas may not be as significant as suggested in the city-level model. In addition, the results of winter recreation amenities are different by park size; negatively related to property values in small neighborhood parks and positively related to property values while in large parks. This could be due to the different types of winter recreation facilities provided in different sized of parks. Winter recreation in small neighborhood parks can include ice (hockey) rinks that are likely linked to noisy group activity, while cross-country skiing in a large park trail is considered a quiet passive activity.

Other active facilities were more likely to positively impact the values of adjacent properties in the NW and SE. By examining the racial composition of these two sectors (see Fig. 2) and recreation preferences of different racial groups suggested by scholars, the preferences of racial groups for different types of recreation activities may be able to explain the differences among sectors. That is, as suggested, non-White populations such as African American and Hispanic prefer active recreation with open views when compared to the White population (Dwyer, 1993; Gobster, 2002; Ho et al., 2005; Payne, Mowen, & Orsega-Smith, 2002; Shinew, Floyd, & Parry, 2004). However, scholars have also found that African Americans prefer indoor recreation (Shinew et al., 2004) when compared to the White population, and this is not consistent with the results found for indoor recreation centers in the NW and SE. This result may, therefore, suggest that the park board review the design and services of indoor recreation centers.

Concluding remarks

This study examines the impacts of diverse park facilities on proximate residential property values, finding that while the impacts generally follow those of previous empirical literature, the types of facilities does have an effect. In the study area, park facilities mainly for passive recreation, with exception of gardens, were likely to have positive impacts on property values. Likewise, facilities mainly for active recreation (e.g., skate parks and children's play area) tended to have negative impacts on adjacent property values. Nonetheless, positive impacts of some active facilities, such as winter recreation and ball fields/courts, was found, especially in the NW and SE quadrants of the study area. The impacts of facilities on property values over distance zones from parks further support the findings in the literature. In addition, the impacts of facilities on property values are different with different park sizes, as gardens and most active facilities are more likely to be beneficial in small parks, while water features tend to introduce the largest positive impact when located in large parks.

The results of this paper reveal that while there is some truth to the general "passive versus active" perception of park impacts on

surrounding property values, the relationship is not as clear-cut and requires one to consider the diverse types of parks and the neighborhoods in which they are located. By more closely measuring the impacts of park facilities on proximate property values, this research aims to help park authorities and designers better identify the potential consequences of a specific park facilities. However, as mentioned, other factors that can influence the outcome of the effects need to be incorporated in future research. More applications in other cities and towns can help increase sample size and external validity. They also may provide more precise suggestions on the impact of park facilities on property values and how neighborhood characteristics such as demographic composition influence these impacts. This study also points to the flaws in the oversimplified rules of thumb often employed by park officials to determine which facilities do or do not add value, and where. As municipal and park budgets tighten, it is clearly important that park officials and designers consider ways of limiting negative consequences (e.g., disturbance) and maximizing positive ones (e.g., accessibility to recreation and aesthetics), in an effort to ensure that such spaces add as much as possible to economic value.

References

- Arvanitidis, P. A., Lalenis, K., Petrakos, G., & Psycharis, Y. (2009). Economic aspects of urban green space: a survey of perceptions and attitudes. *International Journal of Environmental Technology and Management*, 11, 143–168.
- Bolitzer, B., & Netusil, N. R. (2000). The impact of open spaces on property values in Portland, Oregon. *Journal of Environmental Management*, 59, 185–193.
- Brabyn, L., & Sutton, S. (2013). A population based assessment of the geographical accessibility of outdoor recreation opportunities in New Zealand. *Applied Geography*, 41, 124–131. <http://dx.doi.org/10.1016/j.apgeog.2013.03.013>.
- Chalkias, C., Papadopoulos, A. G., Kalogeropoulos, K., Tambalis, K., Psarra, G., & Sidossis, L. (2013). Geographical heterogeneity of the relationship between childhood obesity and socio-environmental status: empirical evidence from Athens, Greece. *Applied Geography*, 37, 34–43. <http://dx.doi.org/10.1016/j.apgeog.2012.10.007>.
- Cohen, D. A., McKenzie, T. L., Sehgal, A., Williamson, S., Golinelli, D., & Jurie, N. (2007). Contribution of public parks to physical activity. *American Journal of Public Health*, 97(3), 509–514.
- Coughlin, R. E., & Kawashima, T. (1973). *Property values and open space in Northwest Philadelphia: An empirical analysis*. In *Regional Science Research Institute (RSRI) discussion paper series: no. 64*.
- Crompton, J. L. (1999). *Financing and acquiring park and recreation resources*. Champaign, IL: Human Kinetics.
- Crompton, J. L. (2001a). *Parks and economic development*. American Planning Association.
- Crompton, J. L. (2001b). The impact of parks on property values: a review of the empirical evidence. *Journal of Leisure Research*, 33(1), 1–31.
- Crompton, J. L. (2004). *The proximate principle: The impact of parks, open space and water features on residential property values and the property tax base* (2nd ed.). National Recreation and Park Association.
- Crompton, J. L. (2005). The impact of parks on property values: empirical evidence from the past two decades in the United States. *Managing Leisure*, 10, 203–218.
- Crompton, J. L., & Nicholls, S. (2006). An assessment of tax revenues generated by homes proximate to a greenway. *Journal of Park and Recreation Administration*, 24(3), 103–108.
- Danzer, A. G. (1987). *Public places: Exploring their history*. Nashville, TN: American Association for State and Local History.
- Dwyer, J. F. (1993). Outdoor recreation participation: an update on blacks, whites, Hispanics, and Asians in Illinois. In P. H. Gobster (Ed.), *Managing urban and high-use recreation settings* (pp. 119–121). St. Paul, MN: USDA Forest Service North Central Forest Experiment Station.
- Espey, M., & Owusu-Edusei, K. (2001). Neighborhood parks and residential property values in Greenville, South Carolina. *Journal of Agricultural and Applied Economics*, 33(3), 487–492.
- Fox, T. (1990). *Urban open space: An investment that pays*. New York, NY: The Neighborhood Open Space Coalition.
- Gatrell, J., & Jensen, R. (2002). Growth through greening: developing and assessing alternative economic development programmes. *Applied Geography*, 22(4), 331–350. [http://dx.doi.org/10.1016/S0143-6228\(02\)00049-8](http://dx.doi.org/10.1016/S0143-6228(02)00049-8).
- Gobster, P. H. (2002). Managing urban parks for a racially and ethnically diverse clientele. *Leisure Sciences*, 24, 134–159.
- Hagerty, J. K., Stevens, T. H., Allen, P. G., & More, T. (1982). Benefits from urban open space and recreational parks: a case study. *Journal of the Northeastern Agricultural Economics Council*, 11(1), 13–20.
- Hammer, T. R., Coughlin, R. E., & Horn, E. T., IV (1974). The effect of a large urban park on real estate value. *Journal of the American Planning Association*, 40(4), 274–277.
- Ho, C., Sasidharan, V., Elmendorf, W. F., Willits, F. K., Graefe, A., & Godbey, G. C. (2005). Gender and ethnic variations in urban park preferences, visitation, and perceived benefits. *Journal of Leisure Research*, 37(3), 281–306.
- Jim, C. Y., & Chen, W. Y. (2009). Diversity and distribution of landscape trees in the compact Asian city of Taipei. *Applied Geography*, 29(4), 577–587. <http://dx.doi.org/10.1016/j.apgeog.2009.01.002>.
- Kitchen, J. W., & Hendon, W. S. (1967). Land values adjacent to an urban neighborhood park. *Land Economics*, 43, 357–360.
- Kovacs, K. F. (2012). Integrating property value and local recreation models to value ecosystem services from regional parks. *Landscape and Urban Planning*, 108(2–4), 79–90. <http://dx.doi.org/10.1016/j.landurbplan.2012.08.002>.
- Lutzenhiser, M., & Netusil, N. R. (2001). The effect of open spaces on a home's sale price. *Contemporary Economic Policy*, 19(3), 291–298.
- Mertes, J. D., & Hall, J. R. (1995). *Parks, recreation, open space and greenway guidelines*. The National Recreation and Park Association.
- More, T. A., Stevens, T., & Allen, P. G. (1988). Valuation of urban parks. *Landscape and Urban Planning*, 15, 139–152.
- Murray, A. T. (2001). Strategic analysis of public transport coverage. *Socio-Economic Planning Sciences*, 35(3), 139–152.
- 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, 181–198.
- Pine, S. L. (March 2009). The time to act is now! *Park and Recreation*, 40–45.
- Sherer, P. M. (2006). The benefits of parks: why America needs more city parks and open space. *The Trust for Public Land*.
- Shinew, K. J., Floyd, M. F., & Parry, D. (2004). Understanding the relationship between race and leisure activities and constraints: exploring an alternative framework. *Leisure Sciences*, 26, 181–199.
- Smallwood, C. (1993). Parks and recreation supplement: it's not easy being green. *The American City and County*, 108(11), PR1–PR11.
- Smith, D. C. (2008). *Parks, lakes, trails and so much more: An overview of the histories of MPRB properties*. Minneapolis, MN: Minneapolis Park and Recreation Board.
- Taylor, A. F., & Kuo, F. E. (2006). Is contact with nature important for healthy child development? State of the evidence. In C. Spencer, & M. Blades (Eds.), *Children and their environments* (pp. 124–140). Cambridge, UK: Cambridge University Press.
- Taylor, A. F., Wiley, A., Kuo, F. E., & Sullivan, W. C. (1998). Growing up in the inner city: green spaces as places to grow. *Environment and Behavior*, 30(1), 3–27.
- The Center for City Park Excellence. (2010). *2010 City park facts*.
- Voicu, I., & Been, V. (2008). The effect of community gardens on neighboring property values. *Real Estate Economics*, 36(2), 241–283.
- Weicher, J. C., & Zerbst, R. H. (May 1973). The externalities of neighborhood parks: an empirical investigation. *Land Economics*, 99–105.
- Woolley, H. (2003). *Urban open spaces*. New York, NY: Spon Press.
- Wu, C., & Sharma, R. (2012). Housing submarket classification: the role of spatial contiguity. *Applied Geography*, 32(2), 746–756. <http://dx.doi.org/10.1016/j.apgeog.2011.08.011>.