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The Impact of Greenways and Trails on Proximate Property Values: An Updated Review

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Executive Summary

In the 1980s a "perfect storm" emerged that enabled trails and greenways to move to a central role in contemporary discussions of urban planning. It was comprised of three elements: Railbanking legislation that preserved railroad corridor rights-of-way and authorized their conversion to trails; federal funding for trails in transportation bills; and a public perception of trails as a priority urban infrastructure amenity.

When trails are retrofitted through communities, they are invariably opposed by some proportion of proximate property owners who fear a devaluation of their property. To address this issue, a number of opinion surveys were administered between 1978 and 2006 to residents living proximate to trails. 16 such studies were reviewed. They revealed that in both urban and rural contexts only 6% perceived the trail to negatively impact their property value. However, while 47% of the 2,647 respondents living close to one of the 22 urban trails believed it increased their property's value, this was believed by only 16% of the 1,212 who resided proximate to one of 10 rural trails.

Opinion data provide general impressions, but they lack empirical verification and quantitative dollar amounts. The emergence of GIS technology and hedonic analysis in the post-2000 era remedied these limitations. Twenty hedonic analyses were identified and their results showed that proximity to a trail resulted in home prices that typically were between 3% and 5% higher than those of comparable homes in the area.

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In the past decade, several cities have developed urban mega-trails which are defined as large-scale investments that receive enduring visibility, have long-term mass appeal, and have a substantial impact on a community's image and identity. Reviews of hedonic analyses undertaken at the three most prominent mega-trails in New York City, Chicago, and Atlanta confirmed the proximate premiums were generally much higher than those of ordinary trails. Invariably, this created a need to address issues of gentrification and social justice.

The review's findings suggest that future research on trails should focus on two nuances. First, it is clear that trails are not homogeneous. There is a need for studies to differentiate among trails with diverse characteristics. Second, the use of electronic data bases has resulted in hedonic analyses incorporating larger samples drawn from more expansive geographical areas. A consequence of this "scaling up" is that potentially substantial differences in the local impact of trails are obscured because only average values are reported. The averages likely underrepresent the impact of some trails and over-represent that of others. The need is for trail specific studies that disaggregate the data by specifying the characteristics of both trail type and abutting demographics.

Keywords

Greenways, hedonic analyses, planning, property values, trails

Introduction

Greenway trails potentially provide multiple benefits, but from a recreation perspective they have two major functions: (1) to link and facilitate hike and bike access between residential areas and places of employment and/or parks, and (2) to provide opportunities for linear forms of outdoor recreation (e.g. hiking, jogging, bicycling, inline skating, horseback riding, cross-country skiing, and ordinary walking).

Most people intuitively accept that proximity to a passive park or golf course often has a positive impact on property values, but this acceptance may not extend to trails. When a trail is proposed in a community, opposition and controversy frequently emerge. Consider the following scenario:

> When the Chicago and North Western rail line west of Dubuque, Iowa, was closed, a nonprofit group, Heritage Trail Inc., campaigned for it to become a 26-mile multiuse trail. The county commissioners were aware there were some who were outraged by the idea, and so held a hearing to address the question. When they arrived at the meeting, supporters of the trail were surprised to find the auditorium packed with rights-of-way neighbors emotionally claiming that a recreational trail would bring "criminal elements" from Dubuque into their rural communities (Little, 1990).

This scenario is familiar to many recreation and park professionals, elected officials, and consultants. While there are likely to be many enthusiastic advocates when a proposal to retrofit a trail through a community comes forward, inevitably there are also likely to be vocally passionate opponents who fear a flow of strangers passing through their neighborhoods will result in proximate properties being devalued be-

cause of a loss of privacy, trespassing, litter, noise, vandalism and crime. The reactions of these two groups are explained by adaptation-level theory and social judgement theory.

Adaptation-level theory (Helson, 1964; Monroe, 1973) explains adjustments to preceding conditions. It directs that experience with prior stimuli creates an adaptation level or reference point. The theory recognizes that the merits of a new stimulus, in this case a trail, are not evaluated in a vacuum, but are judged against the long-established previous condition of the proximate land being absent of people. This is the strong anchor and reference criterion against which the merits of anticipated changes associated with a new trail will be evaluated.

Social judgement theory (Sherif & Hovland, 1961) complements adaptation-level theory by recognizing that new information may change the reference point for comparison and, consequently, change individuals' resultant evaluation of a trail's merits. The theory recognizes that when confronted with a new stimulus (a trail) people will occupy one of three psychological zones: acceptance, rejection, or non-commitment. It suggests the synthesis and conclusions emerging from the systematic review provided in this paper may provide new information that may change the reference point of those impacted by a new trail proposal. For the most part, the review finds that trails have a positive impact on property values. The review's findings may have limited impact on those who passionately reject the concept of a trail, because they are unlikely to be motivated to process evidence that is not consistent with their passionate beliefs (Petty & Cacioppo, 1981). However, the findings are likely to reaffirm and strengthen the advocacy and commitment of those who are in the acceptance zone. Perhaps the most important role of the review's findings is their potential to persuade those who are noncommittal to move into the acceptance zone.

An early review of the impact of trails on property values in this journal identified nine studies (Crompton, 2001). With one exception, they were all surveys seeking the opinions of people who lived near trails. This updated review extends Crompton's earlier work by extending the number of studies to incorporate 16 opinion surveys representing respondents who live proximate to 22 urban and 10 rural trails; and 20 hedonic analyses that incorporated trails.

In 1987, the President's Commission on Americans Outdoors recommended: "Communities establish greenways, corridors of private and public recreation lands and waters, to provide people with access to open spaces close to where they live, and to link together the rural and urban spaces in the American landscape" (1987, p. 142). In the 30 years following the Commission's report, several thousand multi-use and greenway trails in the U.S. were developed on public lands or on easements across private property in hundreds of communities across the country. Three factors came together to create a "perfect storm" that facilitated this rapid growth: railbanking land, federal funding for trails in transportation bills, and the perception of trails as being a primary community amenity.

In 1983, Congress amended section 8(d) of the National Trail Systems Act (often called the Railbanking Act or the Rails-to-Trails Act) to preserve established railroad corridors for interim trail and future rail use (Public Law 88-11, p. 7). This law allowed a railroad to free itself of ongoing cost and responsibility for an unprofitable rail line by transferring it by sale, donation, or lease to a qualified private or public agency, called

an "interim trail manager" that was willing to assume financial responsibility for the management of the right-of-way.

In 1986 the Rails-to-Trails Conservancy (RTC) was formed as a nonprofit organization with a narrowly focused mission to capitalize on this opportunity. Within five years, the RTC had over 40,000 members (Fletcher, 2006). By the organization's 30th anniversary in 2016, more than 2,000 rail trails totaling approximately 24,000 miles of multi-use trails had been built (Harnik, 2019).

Railbanking provided a vehicle to acquire the land, but the requirement to compensate adjacent landowners and the cost of transitioning rail line beds to hike-bike trails were barriers to realizing the program's potential. Much of this barrier was removed by the 1992-1997 Federal Transportation Bill. This was the second factor contributing to the rapid growth of trails. For the first time, this Bill included an enhancement program that required allocating 10% of all federal transportation funds, amounting to $3 billion over six years, to non-traditional highway projects that enhanced the existing transportation infrastructure. Trails were a primary targeted area for this enhancement funding. The funds provided incentives for local or state entities to develop trails, since if they provided 20% of a project they were eligible for the federal government to fund the remaining 80%. Similar enhancement funding for trails was included in every subsequent Transportation Bill. The impact was dramatic. In 1992, 50 trail projects were funded with $22.9 million. In 2016, 1511 trail projects were funded with $890 million (Federal Highway Administration, 2016).

The third factor driving the rapid growth of trails was emergence of a widespread public perception that trails were a primary community attribute. The National Association of Homebuilders periodically conducts surveys asking homebuyers to rate 19 community features. The most recent survey showed that walking/jogging trails were ranked either third or fourth on the list by all age cohorts (Emrath, 2016). The prominence of trails reflects their increased role in both the commuting and leisure dimensions of people's lives. As bike trails proliferated, biking in urban areas became safer, so more commuters biked to work and desired to live in bike-friendly neighborhoods (Urban Land Institute, 2016).

Measuring Impact with Residents' Opinion Surveys

Early measures of the impact of greenway trails on property values relied on responses to surveys of residents whose properties were proximate to a trail. Typically, they were asked two questions: Did the trail increase or decrease their property's value?, and Was the property likely to sell more quickly or more slowly because of its proximity to the trail?

This approach had three obvious limitations. First, the studies ascertained whether or not an effect on property values existed in the minds of proximate residents. Responses were subjective best guesses given by homeowners some of whom may have given little or no thought to the issue, while the answers of others may not have been informed either by personal experience with recent market transactions or by knowledge of comparable sales transactions. Second, the sample sizes of these studies were small (Table 1). Third, out of the 16 studies summarized in Table 1, only one (Lindsay & Knapp, 1999) appeared in a refereed journal. Thus, it is likely there are limitations in design, sampling, data collection and analytical techniques, so they may not possess the rigor that is expected in peer-reviewed social science.

Table 1

Proximate Residents' Perspectives of the Impact of Trails on Property Value

Authors	Date	Trail Location	Survey Respondents	Sample Size	Increase	Neutral/Don't Know	Decrease
Urban Residents' Perspectives							
East Bay Regional Park District	1978	Lafayette-Morage Trail CA	Adjacent	205	36%	57%	7%
Zarker et al.	1987	Burke-Gilman Trail, Seattle, WA	Adjacent single family	110	44%	47%	9%
			Within 1 Block single family	159	52%	39%	9%
			Adjacent condominium owners	100	52%	47%	1%
Moore et al.	1992	Lafayette-Morage Trail CA	Adjacent Nearby	172	53%	44%	3%
				142	47%	52%	1%
Alexander	1995	Highline Canal Trail, CO Weir Gulch Trail, CO Willow Creek Trail, CO	Adjacent	26	35%	61%	4%
			Within a block of the trail	143	33%	62%	5%
Tedder	1995	3 Greenways in Cary, NC	Adjacent and Nearby	109	55%	42%	3%
Quayle and Hamilton	1999	4 Greenways in Vancouver and Victoria, British Columbia, Canada	Adjacent and Nearby	163	74%	25%	1%
Lindsey and Knapp	1999	Crooked Creek Greenway, Indianapolis, MA	Adjacent and Nearby: Property Owners	358	36%	59%	5%
			Renters	44	48%	52%	0%
Greer	2000	Omaha, NE	Within one block of trails	149	42%	56%	2%
Lindsey et al.	2002	Trails in six Indiana cities: Fort Wayne River Greenway Trail Maple City Greenway Trail Pennsy Rail Trail, Greenfield Monon Trail, Indianapolis Cardinal Greenway Trail, Muncie Prairie Duneland Trail, Portage	Adjacent and Nearby	122	92%		8%
				66	92%		8%
				18	90%		10%
				217	95%		5%
				137	86%		14%
				82	89%		11%
Bai & Stanis	2013	MKT Rail Trail, Columbia, MO	Within 200 yards of the trail	149	56%	44%	0%
Urban Residents' Weighted Average				**2,627**	**47%**	**47%**	**6%**

Table 1 (cont.)

Rural Residents' Perspectives							
East Bay Regional Park District	1978	Alameda Creek Trail CA	Adjacent	205	18%	78%	4%
Mazour	1988	Root River Trail	Adjacent	21	14%	72%	14%
		Luce Line Trail MN	Adjacent	53	58%	33%	9%
Moore et al.	1992	Heritage Trail, IO	Adjacent	51	14%	72%	14%
			Nearby	49	21%	77%	2%
		Tallahassee – St. Marks Historic Railroad Trail, FL	Adjacent	107	16%	74%	11%
			Nearby	92	21%	77%	2%
Murphy	1992	Bush Creek Trail, Santa Rosa, CA	Adjacent	75	23%	69%	8%
PKF Consulting[a]	1994	Northern Central Rail Trail, MD	Baltimore County (within 300 yards of the trail)	545	63%	30%	7%
Feeney	1997	Mohawk-Hudson Trail, NY	Adjacent and Nearby	215	7%	86%	7%
Vogt, Van der Would, Lynch, & Nelson	2002	Pere Marquette Rail Trail, Clare, MI	Adjacent	157	18%	77%	5%
Steger, Vogt, & Nelson	2006	Fred Meijer White Pine State Park Trail, Alma, MI	Adjacent	187	24%	71%	5%
Rural Residents' Weighted Average				**1,212**	**16%**	**78%**	**6%**

[a]The PKF Consulting data are omitted from this average, since they represent county wide respondents rather than only those living proximate to a trail.

These limitations, however, are offset by two advantages. First, responses to the 16 studies were primary data derived from direct contact with residents, so their interpretation is explicit. This contrasts with the secondary data sources derived from existing statistics that comprised the inputs to the hedonic analyses discussed in the next section of this paper, whose results are interpreted by inference. Second, although the sample sizes of many of the opinion studies are small, the consistent pattern emerging from them and the diversity of milieu in which they were undertaken enables a reasonable level of confidence to be placed in generalizations drawn from them. Thus, despite their limitations, a review of residents' opinion surveys offers complementary insights to the hedonic analyses.

The summary of findings in Table 1 shows that in both urban and rural contexts, only 6% perceived trails had a negative impact on their property values. This is an important finding because it is drawn from an aggregate sample of 3,829 people who lived adjacent or close to 32 trails of many different types. The cumulative findings of these studies indicate that negative externality concerns relating to loss of privacy, trespassing, litter, vandalism, increased crime, and other problems that are passionately invoked by opponents when trails are proposed, for the most part, dissipate after residents have experienced living proximate to a trail.

In contrast to the 6% who perceived a decrease in their value, 47% of the 2,627 respondents proximate to urban trails reported perceived increases in their property's value. This was much higher than the 16% of 1,212 respondents who resided proximate to rural trails. None of the studies reported a negative percentage that was greater than the percentage perceiving an increase in value. Opportunities to engage in linear recreation activities and commuting travel that were "off-street" appear to be valued more highly in urban areas.

Several of the studies asked residents if they believed their proximity to a trail would result in a faster or slower sale of their property. Quicker sales are likely to be an indicator of a purchaser's desirability to live close to a trail, and to expedite an owner's future move to another property which is a very real stress-reducing personal benefit. Responses to this question are summarized in Table 2. In addition to surveying residents, some of the studies solicited the perspectives of realtors who frequently commented that they promoted the proximity of a home to a trail. The data in Table 2 reinforce those in Table 1. Among those residing proximate to urban trails, 55% perceived a sale would be faster and 4% slower, which is reasonably consistent with, and appears to reinforce, the property value averages reported in Table 1.

Measuring Property Impact Using Hedonic Analysis

The opinion studies indicated that a substantial proportion of property owners, especially in urban areas, believed their property would sell at a premium because of its proximate location to a trail. However, these opinions lacked behavioral verification and did not indicate the magnitude of the premium. In 1974, Rosen published his seminal work on hedonic pricing. The emergence of the hedonic approach removed criticisms associated with opinion studies by providing behavior based quantifiable estimates of the value of proximity to trails, while simultaneously controlling for the variety of structural, locational, neighborhood and environmental factors that influence property prices. The advent of GIS technology in the late 1990s made it relatively easy

Table 2

Proximate Residents' Perspectives of the Impact of Trails on the Speed at Which Their Property is Likely to Sell

						Don't Know	
Zarker et al.	1987	Burke-Gilman Trail, Seattle	Adjacent single family	110	44%	47%	9%
			Within one block single family	159	52%	49%	9%
			Adjacent condominium owners	100	52%	47%	1%
Murphy	1992	Bush Creek Trail, Santa Rosa, CA	Adjacent	75	29%	54%	17%
PKF Consulting	1994	Northern Central Rail Trail, MD	Within 300 yards of the trail	442	68%	-	32%
Alexander	1995	Highland Canal Trail	Adjacent	26	46%	46%	8%
		Weir Gulch Trail Willow Creek Trail	Within a block of the trail	143	33%	62%	5%
Feeney	1997	Mohawk-Hudson Trail, NY	Adjacent and Nearby	215	21%	65%	14%
Quayle and Hamilton	1999	4 Greenways in Vancouver and Victoria, British Columbia, Canada	Adjacent and Nearby	163	63%	34%	3%
Greer	2000	3 trails in Omaha, NE	Within a block of the trail	149	65%	33%	2%
Lindsey et al.	2002	Trails in 6 Indiana cities:					
		Fort Wayne River Greenway Trail	Adjacent and Nearby	122	93%		7%
		Maple City Greenway Trail					
		Pennsy Rail Trail, Greenfield		66	88%		15%
		Monon Trail, Indianapolis		18	90%		10%
		Cardinal Greenway Trail, Muncie		217	90%		10%
		Prairie Duneland Trail, Portage		137	81%		19%
				82	85%		15%
Vogt, Van der Would, Lynch, & Nelson	2002	Pere Marquette Rail Trail, Clare, MI	Adjacent	157	28%	69%	3%
Steger, Vogt, & Nelson	2006	Fred Maijer White Pine State Park Trail, Alma, MI	Adjacent	187	40%	56%	4%
Bai & Stanis	2013	MKT Rail Trail, Columbia, MO	Within 200 yards of trail	149	71%	25%	4%
Weighted Average				**2,717**	**55%**	**31%**	**4%**

to use multi-listing services' electronic data to compare home sales and to incorporate alternate measures of proximity and accessibility variables into hedonic models (e.g., identification of proximate trail properties could be done more quickly, and walking/driving distances could be used rather than only straight line measurements).

Results from 20 studies that used GIS and hedonic analysis are summarized in Table 3. All these studies used actual sales price; and almost all of them measured distance from each house to the nearest trail entrance by the preferred method of travel distance along the street network, rather than by a straight line. Trail advocates frequently cite results from an early study of the impact of three green belts in Boulder, Colorado, to support their advocacy (Correll, Lillydahl, & Singell, 1978). However, these do not conform to the definition of a greenway trail; rather, they are passive park areas.

While 14 of the studies appeared in the scientific literature and were subject to peer critique, the remaining six did not have the benefit of this vetting. However, there appeared to be no obvious systemic variations in the results reported in the two types of publication. The results summarized in Table 3 indicate that a small positive premium of between 3% and 5% was the most widespread outcome for single-family homes located proximate to a trail. However, there were outliers suggesting the premium may be as high as 15%, or be a small negative percentage.

The Impact on Property Values of Mega-Trails

Urban Mega-Trails have emerged in the past decade as a new phenomenon. They are defined here as large-scale investments which receive enduring national visibility; have long-term mass popular appeal; and have a substantial positive impact on a community's image and identity. This section reviews results from hedonic analyses undertaken on the three most prominent U.S. examples.

The High Line

The 1.5-mile High Line in New York City cost $187 million. The elevated trail is 18-30 feet above street level along a former railroad line, located on the west side of Manhattan. It was built in three stages, which were opened in 2009, 2011, and 2014. In 2016, 7.6 million visits were recorded (Doctoroff, 2017) and it quickly emerged as one of the most iconic landmarks and public spaces of the 21st century (Rosa & Lindner, 2017).

The mid-range estimate in the original 2002 feasibility study was that revenues on properties within one block of the High Line would generate an additional $8 million in taxes annually when it was completed (i.e., $160 million over 20 years) (Hamilton, Rabinovitz, & Alschaler, 2002). However, by 2014 when Section 3 of the trail opened, the tax revenue estimate had been raised to $900 million over 20 years (Quintana, 2016). This represented a remarkable return on the original capital investment of $187 million, especially since the city's contribution was limited to $123 million. The New York City Economic Development Corporation reported, "Prior to the High Line's redevelopment, surrounding residential properties were valued 8% below the overall median for Manhattan. By 2011, the value of property within a 5-minute walk of the High Line had increased by 103%" (Rosa & Lindner, 2017, p. 143).

A hedonic analysis assembled the annual assessed values of 1,382 apartment properties located within 2 miles of the High Line for each year between 2007 and 2012. The properties were assigned to one of six distance zones at one-third mile intervals from

Table 3

The Results of Studies Using Hedonic Analysis to Estimate the Impacts of Trails and Greenway on Proximate Property Values

Author Publication Date	Data Collection Period	Location	Proximity Definition	Sample Size	Proximity Effect
Quayle/Hamilton 1999		3 Greenways in Vancouver, Canada			Compared to properties 150-400 feet distance from the greenways
	1994-96	Sturgeon Bank	Adjacent	92	15.6% premium
	1995-96	Cougar Creek	Adjacent	151	11.9% premium
	1994-96	Kanaka Creek	Adjacent	12	14.45% premium
Lindsey et al. 2003	1999	Marion County/ Indianapolis, Indiana All Greenways -------- Greenways with Trails Conservation Corridors ------- Monon Trail Other Greenway Trails Conservation Corridors	Within a half mile	2,157 1,253 1,087 334 957 1,087	$3,731 premium (4%) $4,384 premium (4.7%) $5,317 premium (5.7%) $13,059 premium (14%) Negative $1,025 (-1%) $2,239 premium (2.4%)
Payton & Oltensmann 2014	2005-2010	The Monon Trails Other Greenway Trails	Within 0.5 miles of a trail	46,350 property sales	Monon trails: 4.1% premium, but declines as neighborhood income increases. Other trails: 1.8% remaining consistent across all neighborhoods.
Munroe, Parker & Campbell 2004	2000-2003	Catawba Regional Trail, Mecklenburg and Gaston Counties, NC	10% of all county single family residence sales that Were within 5000 feet of a trail	Mecklenburg: 8,591 Gaston: 430	0.0122% 0.0376%

Table 3 (cont.)

		Cities -on-street lanes -off-street roadside trails -off-street non-roadside trails Suburbs -on-street lanes -off-street roadside trails -off-street non-roadside trails			$0 -$2,272 $510 -$364 -$1,059 -$240
Sander et al. 2010	2005	Minneapolis – St. Paul, MN	Distance to the nearest non-park trail	9,992 single family homes	No significant impact on sales price
Welch et al. 2016	2002-2013	Portland, OR On street lanes Local multi-purpose paths Regional multi-purpose paths	Distance to the nearest trail	146,361	For each foot distance from a bike lane: -$2.47 $0.01 $0.86
Asabere & Huffman 2009*	2001-2002	San Antonio/Bexar County, TX Trails. Greenbelts. Trails with Greenbelts	N/A	 870 500 100	 1.7% 3.9% 4.8%
Karadeniz 2008	2003-2005	Little Miami Scenic Trail Between the cities of Loveland and Milford, OH	Within 1 mile of a trailhead	376	$7.05 for every foot closer a property is to a trail i.e. 4.7% on an average home
Parent & vom Hofe 2013*	2005	Little Miami Scenic Trail, Cincinnati	Within 10,000 feet of nearest trailhead	1,762	Market value increases by 0.000875% (i.e. $230) for each foot closer to a trailhead
Noh 2019	2005-2012	Whittier, CA	Within ¼ mile of a converted rail to trail	637 pre conversion 703 post conversion single family home sales	5.95% 8.2%
Kashian et al. 2018	1993-2016	Muskago, WI	Within the city boundaries	6,938 single family home sales	8.6% increase in sales price after the trail opened

*Published in a refereed journal

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the High Line. The assessment values of apartments in each of the closest five zones were compared with those in the outer zone (1.67-2.0) miles. The analysis revealed small premiums in the closest zone (0-0.33 miles) of 5% and an additional 2% in 2008 and 2009, respectively; and 2% and an additional 2% in those years in the 0.33-0.67-mile zone. However, in 2010 after the trail opened there were much larger incremental increases of 10% and 7%, respectively, in the two zones compared to 2009 (Levere, 2014).

The findings of a subsequent analysis in 2016 by a realty company that tracked sales in the area indicated that the earlier finding of the trail's impacts were substantial underestimates (Quintana 2016). The analysis showed between 2011 and 2016 the median price of properties abutting Section 1 of the High Line that opened in 2009 increased by 50.6%, while Section 2 prices increased by 48.2%, as compared to a price increase of 31.4% for properties one block away.

The Bloomingdale 606 Trail

The 2.7-mile Bloomingdale 606 Trail in Chicago cost $95 million of which $50 million was federal funds, $5 million came from the city, and $40 million was raised privately. It was inspired by the success of the High Line and is similarly built on an abandoned freight line along Bloomingdale Avenue in Chicago. Groundbreaking was in Fall 2013 and it opened to the public in June 2015. It connects diverse neighborhoods. Western Avenue effectively divides the trail into "606 East" and "606 West." 606 East is higher income, mainly white, and largely condominiums. 606 West is lower income, mainly Latino, and predominantly comprised of two- to four-unit rental properties (Smith, Duda, Lee, & Thompson, 2016).

House prices in the wealthier 606 East peaked in early 2009, experienced some modest declines during the Great Recession, and showed modest appreciation during the recovery, so by 2016 they were at the highest point since 2009. Conversely, prices in the lower income 606 West continued to fall until 2012. Their strong recovery after that date largely coincided with the development and opening of the 606 trail. Between breaking ground on the trail in 2013 and 2016, prices in 606 East increased by 13.8%, while prices in 606 West increased by 48.2% (Smith et al., 2016).

A hedonic analysis undertaken by Smith et al. (2016) reported that before 2012 the abandoned and decrepit rail line corridor had a negative impact on property values within 1/5th of a mile of -1.4%. After groundbreaking of the 606, the rail line no longer exerted a negative impact in 606 East, but buyers did not pay any premium for homes near the trail. However, buyers in 606 West paid a large premium of 22.3% for properties within 1/5th of a mile of the 606. The premium quickly dissipated with distance from the trail, declining to 11.2% at ½ mile distance and after 3/5 of a mile the premium was statistically insignificant. In 2015, the median sales price for a single-family home within 1/5 of a mile of the 606 was $450,000 on the lower income West side and more than $100,000 of that price could be attributed to the 606. Although the median home value of $815,000 was much higher in 2015 in 606 East, the trail made no contribution to that sales price.

The Atlanta Beltline

The 33-mile network of multi-use trails that constitutes the $4.8 billion Atlanta Beltline is scheduled to be completed in 2030. The scale of this trail far surpasses that of the High Line and 606 trails and is unprecedented in major cities. The core of the 33

miles of the Beltline system is a 23-mile trail and light rail loop that encircles Atlanta's central business district and the greater core of the city. It is approximately 4 miles west to east and 6 miles north to south and is being developed along a former industrial rail line. The primary funding source is a tax allocation district (TAD) which is expected to provide $1.3-$1.7 billion. The TAD funding is predicated on an assumption that the property tax base adjacent to the Beltline project will appreciate sufficiently with the trail's development that the resultant increment of increased tax revenue would generate the $1.3-$1.7 billion. The parameters of the TAD are defined by the pre-existing railroad rights-of-way and supplemented by some large parcels of land adjacent to them.

Some initial understanding of the project's potential impact was provided by a hedonic analysis that focused on impacts resulting from public knowledge of the Beltline's early planning which received prominent and extended media coverage The author noted: "Given the long time-lines involved in large projects, and the possibility that land speculators and others may drive up land values well before breaking ground, it is important to analyze price changes from the point of initial public and investor awareness" (Immergluck, 2009, p. 1724).

Data for the study were the selling price of approximately 25,000 single-family detached properties in the city of Atlanta in the 2001-2006 period. Public discussion of the Beltline commenced in 2003, so the data enabled comparisons to be made of home prices before and after the announcement. Properties in the northern arc of the Beltline were primarily higher income residences, while those in the southern arc were lower income. Each property was assigned to one of 7 zones reflecting increasing distances from the TAD within one of the two arcs. They were compared with properties located outside the two-mile distance from the TAD area.

Results showed the higher income north side properties followed the price trajectory of properties located outside the two-mile distance from the TAD, indicating announcement of the Beltline and its attendant publicity had no impact on them. In contrast, the announcement had a marked effect on the lower income south side properties. For example, in 2004 properties within a quarter-mile of the TAD sold for 30% more than otherwise similar outer-area properties. However, the Beltline's impact decayed sharply after approximately a quarter mile. These early data suggested the Beltline would have a major impact on property prices in lower income areas (Immergluck, 2009).

These trends were generally confirmed by the same author in a similar subsequent study in 2017 using data from 27,213 property sales. He compared properties within a half-mile of the Beltline with those beyond a half mile and reported: "From 2011 to 2015, depending on the segment of the Beltline, values rose 17.9% and 26.6% more for homes within a half-mile of the Beltline than elsewhere." (Immergluck & Bolan, 2017, p. 7), suggesting a 20%-30% premium was associated with the Beltline. The hedonic analyses were supported by anecdotal reports suggesting the impact varied widely from minimal to substantial among the 50 neighborhoods through which the Beltline passes with the largest gains occurring in the higher income southern arc (Knock, 2017). However, the Beltline incorporates light rail and many developers consider much of its increased value emanates from its utility as a transit artery, rather than its utility as a trail (Harnik, 2019).

Discussion

Six points emerged from the mega-trail studies. First, whereas an "ordinary" trail frequently arouses opposition from those who believe it will negatively impact their property values, opposition to the concept of mega trails was minimal and inconsequential. Protests did emerge at all three sites, but they tended to focus on how the trails would be funded rather than emanating from proximate landowner opposition. Economic stimulus associated with mega-trails makes it likely they will be enthusiastically endorsed by a community's powerful vested interests who have incentives to encourage the investment of public funds in a mega-trail (Hunter, 1953). These vested interests may include real estate developers; financial institutions; cultural elites; construction firms; hotels and restaurants; and elected officials who believe being identified with high visibility, tangible, iconic projects will be seen by voters as evidence that a community is "moving forward." This coalition of elite business and political interests in a community control much of its decision-making and "the system" (i.e., the political decisions that enable them to allocate financial resources, detailed "insider" knowledge of the project, mechanisms for information dissemination, and the legal resources needed to bring mega projects to fruition).

Second, given the magnitude of the investment in mega trails and the relatively limited supply of opportunities for hiking and biking in major cities, it was not surprising to find the premiums for proximate properties generally were substantially higher than those associated with "ordinary" scale trails. Third, mega trials are tourist attractions; hence the interest of hotels in locating proximate to them. A local observer of the High Line stated: "When you go over there you see tourists from all over the world, but you don't see local residents because it's not really a place for us" (Rosa & Lindner, 2017, p. 10).

Fourth, the analyses suggested that impact on property values will not be the same in all neighborhoods. At least in the early years, lower income neighborhoods constitute the "low-hanging fruit" for developers. This leads to substantial increases in tax revenues to government entities, perhaps transforming areas that were previously net financial burdens to the community, to being net financial contributors.

There are two counterpoints that are likely to temper the exuberance associated with the positive financial gains accruing to proximate properties. First are concerns about equity and fairness. This relates to who wins and who loses among those living along a mega trail. The appeal of the trails stimulates gentrification in low income neighborhoods. While this enhances the city's tax base, it is unlikely to be welcomed by lower income residents confronted with paying higher tax bills. Some developers and landowners will choose to invest in upgrading low income property to appeal to new, higher income residents so they can increase rents in response to market demands, while others may be required to raise rents in response to higher property taxes in order to maintain profitability. Evidence from the studies confirmed that mega trails tend to displace groups of residents located in the poorer areas. These people typically are least able to organize and finance community resistance to them. Identification of this trend suggests that policies to incorporate affordable housing into mega trail developments should be established before the trail is constructed. Typically, these concerns are much less prominent when retrofitting ordinary trails through communities. The relatively low premiums for home values associated with ordinary trails means they are much less likely to stimulate gentrification.

A second counterpoint relates to the assumption that all the premium value stemming from the higher tax base of proximate property is "new." It is likely that some of this tax base would have accrued elsewhere in the community if no mega trail had been built. For example, while it is projected that an additional $900 million in tax revenue over 20 years will accrue to government entities from the High Line (Quintana, 2016), some of this $900 million investment in offices, condominiums, apartments, hotels, etc. would probably have occurred elsewhere in New York City if there was no High Line. Only the incremental gains uniquely attributable to the mega trail constitute its net contribution to the tax base.

Concluding Comments

The author of the earlier review of this literature concluded:

> Across the studies there was broad consensus that trails have no negative impact on either the salability of property (easier or more difficult to sell) or its value. There was a belief among some, typically between 20% and 40% of a sample, that there was a positive impact on salability and value. However, the dominant prevailing sentiment was that the presence of a trail had a neutral impact on the salability and value of property (Crompton, 2001, p. 130).

This updated review showed that in both urban and rural contexts, only 6% of respondents perceived trails to have a negative impact on their property, confirming the finding of the earlier review. However, by differentiating between urban and rural contexts, this study revealed a substantial difference between them. Responses from 2,647 home owners residing proximate to 22 urban trails indicated that 47% believed the trail increased their property's value, while among the 1,212 property owners along primarily rural trails, this belief was shared by only 16%.

The findings suggest that, for the most part, fears there will be negative repercussions associated with a trail are likely to be without merit. Studies done after trails have been operational for a number of years, consistently reported they were better neighbors than skeptics expected. Initially, when a trail is retrofitted through a community, it disturbs the environmental status quo (Helson, 1964). When evaluated against the status quo benchmark, some perceive a retrofitted trail as a liability that is likely to reduce their quality of life. However, over time two scenarios are likely to emerge that cause negativism to dissipate. First, experience with it reassures proximate residents that their fears were groundless or overstated. Second, since proximity to a trail is relatively scarce in many urban communities, those who view it as a desirable amenity are likely to pay a premium for properties when they are offered for sale. This suggests the premiums associated with trails are likely to increase over time.

The author of the earlier review suggested a three-point research agenda: "Do greenway trails contribute to increasing property values when other potential influences on those values are also taken into account? How large is the proximate effect? Over what distance does the effect extend?" (Crompton, 2001, p. 130). Insight into these issues was forthcoming from the 20 hedonic analyses. Although there were outliers of positive premiums up to 15% and some instances of small negative premiums, the most widespread outcome for single-family homes located proximate to a trail was a

small positive premium of 3% to 5%. This is much smaller than the likely impact of parks on property values (Crompton, 2001a). However, just as large numbers of active users decrease park premiums (Crompton, 2001a), loss of privacy is likely to reduce the premium associated with trails. The challenge for managers is to design trails that alleviate loss of privacy.

The distance over which trails impact property values was difficult to ascertain, because many of the hedonic studies used only average distances and did not differentiate among distance zones from the trails. However, the limited evidence emerging from studies that did use buffer zones, suggested there are substantial decays in the premium beyond a distance of three blocks from the trail, which is consistent with the findings relating to parks (Crompton, 2001a).

The implications for property values that emerged from analyses on the three urban mega-trails demonstrated that their property premiums were generally much higher than those associated with 'ordinary' trails. Thus, it would be inappropriate to transpose values from them to ordinary trails.

The review revealed three methodological concerns. First, a majority of the hedonic analyses treated trails as a homogeneous variable. Failure to explicitly recognize the heterogeneity of trails assumes the same premium is associated with all forms of them. By definition, the use of an average measure hides variations both above and below the average. Thus, means may be misleading and conceal wide variations in premiums across types of trails (Asabere & Huffman, 2009; Krizek, 2006; Lindsey et al., 2003, 2004). The desirability of residing proximate to a trail is likely to vary according to both the type and context of the trail and individuals' value systems. For example, if a narrow greenway trail in a densely developed area offers a natural habitat with some stream wetland and associated wildlife, it may be perceived as more of an amenity for some than living adjacent to a large park. There is a need for future hedonic studies to be more nuanced and specific when defining the trails variable.

Second, the emergence of electronic data bases has enabled hedonic analyses to incorporate larger samples drawn from more expansive geographical areas. Again, a consequence of this "scaling up" is that potential substantial differences in the local impact of trails are obscured because their premiums are represented by a single mean value. This is an oversimplification since an urban housing market consists of multiple sub-markets with different sub-cultures. Proximal neighborhoods may deviate substantially from one another and from a general mean average. The aggregation of neighborhoods with different sub-cultural characteristics in terms of income, lot size, level of urbanization, different types of housing, ethnic diversity, and so forth is inappropriate because it is likely to hide wide variations. Treating a large geographical area as a single community results in regression-to-the-mean values, since negative and positive responses in individual neighborhoods counterbalance. This concern was highlighted in several studies that reported different premiums occurred at different locations along the same trails (Karadeniz, 2008; Munroe, Parker, & Campbell, 2004; Netusil, 2005; Nicholls & Crompton, 2005). If a study shows no substantive premium, it is not necessarily evidence that trails had no impact on property values. It is possible the impact was more localized than could be detected in a large mega study. Each neighborhood merits its own hedonic model.

Third, the availability of faster computing, improvements in electronic access and GIS, and more accurate statistical tools have enabled hedonic studies to reduce omitted

variable bias (i.e., variables that cause spatial variation in sale prices that were omitted from early models). These improvements have enabled many more potential sources of a property's value to be included in hedonic models. This results in reducing the probability of some value being falsely attributed to an amenity included in a study, when it really belongs to a somewhat related but different variable that is not included in the model. Nevertheless, despite these improvements, omitted variable bias remains a concern. Multi-listing services and tax assessors collect only structural data relating to housing units. Variables that influence price which exist beyond a property's boundaries have to be identified, found, assembled, and merged with the structural data sets using common coordinate systems. Researchers will succeed in incorporating some of these identified influences, but gathering a "complete" list of relevant variables is not generally feasible. It is likely that some variables will be omitted because either they cannot be quantified, or they remain unknown to the researcher.

Finally, the authors acknowledge a potential caveat in that the synthesis and conclusions offered in this paper are based on papers they were able to locate. There is some danger this may result in publication bias. That is, "The tendency on the part of investigators to submit, or the reviewers and editors to accept, manuscripts based on the direction or strength of the study findings" (Scholey & Harrison, 2003, p. 235). The preponderance of findings of papers in this review are positive and social science research projects with positive results are substantially more likely to be published than those with benign or negative results (Franco, Malhotra & Simonovits, 2014; Peplow, 2014). The extent of this bias with respect to this review is indeterminable, but its potential existence nevertheless is acknowledged.

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