Affordable Housing and Walkable Neighborhoods: A National Urban Analysis

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Abstract

Demand for housing in walkable neighborhoods has been increasing rapidly in recent years, as has evidence of the benefits of walkable urban form and walking. These neighborhoods nevertheless remain in short supply, especially for low-income residents. Furthermore, crime, poor market strength, or racial segregation potentially compromise accessibility in lower income neighborhoods. We assess the nationwide supply of urban neighborhoods with walkable access and the extent to which U.S. Department of Housing and Urban Development (HUD)-assisted voucher and project housing enables tenants to live in these neighborhoods. For assisted tenants with walkable access, we analyze whether or not this access is compromised. We aggregated more than 20 million address-level records (2010 to 2012) to the neighborhood level from about a dozen sources to characterize walkable access (using Walk Score), HUD-assisted housing, potential compromising factors, and other neighborhood characteristics. More detailed data were also collected for Atlanta, Boston, Chicago, Miami, Phoenix, and Seattle. We use descriptive methods and logistic regressions to analyze patterns across metropolitan statistical areas, in regions, and between cities and suburbs. We find that only 14 percent of all neighborhoods and 13 percent of all housing units in U.S. metropolitan areas have good walkable access. Public housing has the most walkable access (37 percent), followed by project-based rental assistance (PBRA; 30 percent) and low-income housing tax credits (LIHTC) and housing choice vouchers (both about 23 percent). Accessibility is disproportionately compromised for all tenants (9 percentage points more for public housing and 2 to 3 percentage points more for vouchers, LIHTC, and PBRA) but especially so for public housing tenants in urban areas. For a disproportionate number of other tenants in public housing and PBRA (4 percentage points more than all rental units), accessibility is not compromised, especially in denser cores of suburban areas. Locating public housing and PBRA units in walkable suburbs is one of the mechanisms that work to provide both

Abstract (continued)

accessibility and affordability. In areas with more HUD-assisted housing, the quality of amenities and urban form is poorer and safety is worse than in other accessible neighborhoods, which is not captured by quantitative measures of walkable access. We conclude with a discussion of the implications of these findings.

Introduction

In the United States today, a significant danger exists that walkable neighborhoods with access to quality amenities are becoming scarce for low-income residents. For our purposes, *walkable* neighborhoods are those that offer walking access to services and amenities, including transit, and incorporate a pedestrian-oriented, interconnected street network. Our goal is to provide a foundation to better understand what kinds of strategies could be used to retain affordable housing in walkable neighborhoods. To do that, we need to know (1) where, and to what degree, walkability and affordability are in alignment; (2) whether the benefit of affordable housing in walkable neighborhoods is compromised by negative factors such as crime, poor market strength, and racial segregation; and (3) what other neighborhood factors are associated with walkability and affordability.

Although households in the United States walk the least of households in any industrialized nation (Bassett et al., 2010), the benefits of walkability and walking are well documented (for summaries, see Brown and Plater-Zyberk, 2014; Talen and Koschinsky, 2014b, 2013). Demand for living in neighborhoods with walkable access to amenities and work has been increasing simultaneously (Nelson, 2013; U.S. DOT 2011, 2009). The same research shows that the supply of housing in such neighborhoods has not kept pace, however. Although all households face price premiums for living near amenities, accessible neighborhoods are especially hard to afford for low-income households (Adkins, 2013). The problem is exacerbated when trying to preserve affordable housing within the context of a walkable neighborhood, because walkable and affordable are often at odds. No longer is the goal a matter of producing affordable housing wherever cheap land is found, but affordability is sought in places where land, because of its accessibility, is likely to be more expensive.

Assisted housing for low-income tenants could be one of the mechanisms to increase the accessibility of walkable neighborhoods. It is one of the goals of the U.S. Department of Housing and Urban Development (HUD), which administers the funding for some of the nation's largest subsidized housing programs (the U.S. Treasury administers others), to promote subsidized housing in so-called "sustainable communities;" that is, neighborhoods that are walkable, mixed use, diverse, and dense and that have good transit access. Recent HUD initiatives such as Choice Neighborhoods, financial support of the Center for Neighborhood Technology's Location Affordability Index, Office of Policy Development and Research studies on coordinating housing and transit, and Office of Sustainable Housing and Communities illustrate this focus.

A number of unresolved issues remain, however, and research on the link between affordable housing and walkable locations has uncovered a number of complexities (Been et al., 2010; Pendall and Parilla, 2011; Wen and Zhang, 2009). One issue is that neighborhoods can be walkable in terms of urban form dimensions like small block size and land use diversity, but such neighborhoods might not be the ones that offer the most employment access, the least crime, or the best schools. In some cases, the same indicators of walkability that are appreciated in higher income neighborhoods might not have the same value in neighborhoods where crime is prevalent (Talen and Koschinsky, 2011). Other studies found that the benefits of walkable access to amenities were not realized because of high levels of neighborhood crime (Cutts et al., 2009; Roman and Chalfin, 2008). What needs to be accounted for is whether the interaction between physical form and social disadvantage negates the positive effects of the built environment, or whether it results in some compromising factors that need to be mitigated. We stipulate that poor neighborhood quality lessens the potential benefits of walkability.

Accessibility per se turns out not to be linearly related to income, as we will demonstrate, because many suburban areas are characterized by higher incomes and less walkable access. Lower income neighborhoods in older inner-city areas, similarly, often have better accessibility whereas many less centrally located lower income neighborhoods have fewer amenities or poorer quality amenities. Better school quality, improved safety, larger home size, and more access to green space continue to represent important tradeoffs that keep suburban living attractive, especially for households with children (Knudtsen and Schwartz, 2013; NAR, 2013, 2011). These tradeoffs also explain tensions between fair housing advocates who have been promoting desegregation of subsidized housing in suburban neighborhoods and sustainable community advocates who want to site such housing near centrally located (but often more segregated) transit-oriented development (TOD). At the same time, the NAACP (National Association for the Advancement of Colored People) endorses improved walkability in poor African-American neighborhoods as a civil rights issue to help reduce higher obesity rates in these areas—reducing crime rates is a simultaneous goal to make walking less dangerous (Snyder, 2013). Lower crime rates in suburban areas compared with those in urban areas used to also be a pull factor for suburbs, although the suburbanization of poverty and crime is changing these dynamics (Kneebone and Berube, 2013).

Given the rising popularity of walkable neighborhoods that is reflected in rising home prices in these areas, gentrification pressures and the difficulty in preserving affordable housing in walkable neighborhoods also increase. One of the dilemmas that motivated this research has been that many walkable mixed-use developments and neighborhoods are supposed to be diverse in terms of income, housing types, and sociodemographics but often end up being in such high demand that housing values are driven up and affordability declines (Cortright, 2009; Davis, 1984; Ding and Knaap, 2003; Eppli and Tu, 1999; Pendall and Caruthers, 2003; Pivo and Fisher, 2011; Pollack, Bluestone, and Billingham, 2010; Song and Knaap, 2003; Talen, 2010; Tu and Eppli, 2001; U.S. DOT, FTA, and Reconnecting America, 2008).

Furthermore, research is confirming that demand for transit-served areas is rising, thus resulting in a decrease in affordability (Haughey and Sherriff, 2010; Pollack, Bluestone, and Billingham, 2010; Quigley, 2010). These studies are motivated by a desire to preserve affordable housing in transit-served areas and employment centers, suggesting that the development of affordable housing

in outlying suburbs not served by transit is problematic (Haughey and Sherriff, 2010; Lipman, 2006). With a focus on TODs, studies have found that although a substantial number of affordable apartments are near public transit, affordability for more than two-thirds of those apartments will expire within the next 5 years (Harrell, Brooks, and Nedwick, 2009). A recent study funded by the U.S. Department of Transportation found that many TODs are becoming increasingly unaffordable (Pollack et al., 2010; U.S. DOT, FTA, and Reconnecting America, 2008).

We proceed with an overview of our research focus and questions, discuss existing research, present the data and methods we applied to address these questions, analyze our findings, and end with a conclusion that includes policy implications.

Research Focus

The purpose of this article is to take stock of the walkable neighborhood context of HUD-assisted housing in all U.S. metropolitan areas. We assess the supply of neighborhoods with walkable access to amenities such as grocery stores, retail, restaurants, banks, schools, and parks. We also compare different HUD programs in regards to their walkable access and analyze the extent to which negative factors such as poor market strength, crime, segregation, or poor school quality might compromise such access. Finally, we analyze walkable access in the context of units with expired use restrictions, neighborhood profiles, and zoning and street characteristics. We also compare different metrics of walkability, including walk scores (from https://www.walkscore.com) and the State of Place index of walkability (aggregated from the Irvine-Minnesota Inventory).

We look specifically at the location of HUD-assisted housing (projects and vouchers) in relationship to neighborhood walkability. Project-based housing includes public housing—traditional and HOPE VI (Housing Opportunities for People Everywhere)—project-based rental assistance (PBRA)—such as Section 8 New Construction and Rehabilitation, Section 202 Supportive Housing for the Elderly, and Section 811 Supportive Housing for Persons with Disabilities—low-income housing tax credits (LIHTC), and tenant-based assistance (housing choice vouchers, or HCVs). The following sections will explain the differences among these programs in more detail. Using a detailed measure of neighborhood walkability and locations of HUD-assisted housing, we address the following questions—

1. What is the supply of urban units and neighborhoods with walkable access nationwide? To what extent are affordable rental units in walkable neighborhoods?

2. Does HUD-assisted voucher and project housing enable tenants to live in urban neighborhoods with walkable access?

3. If so, do tenants make tradeoffs in terms of poor market strength, segregation, crime, or poor school quality?

Our analysis is the first to evaluate walkable access and affordability at a national urban scale, for current data (2010 to 2012), and at the address level. We analyze walkable access for the different HUD-assisted housing programs in urban and suburban areas, by region, and for weaker and stronger markets.

Current federal housing policy seeks to promote the development and preservation of affordable housing in sustainable locations. A key aspect of sustainability is the degree to which neighborhoods are walkable—close to services and transit and characterized by a well-connected street network. A fundamental question needs to be answered—to what degree are affordability and walkability at odds? Basic land economics would suggest that they would be, but virtually no research—on a comprehensive, national scale—analyzes this question.

Our article dovetails with existing research linking transit and affordable housing, but our focus is on the degree to which affordable housing is in neighborhoods that are walkable—that is, beyond being transit served, do residents have ready access within walking distance to services and amenities, and is the street network conducive to pedestrian travel? It is important to identify both transit and walkable access because locations can be adjacent to transit but still not walkable. Being truly walkable implies not only transit access but also proximity to amenities and services and street connectivity that facilitates pedestrian routes. Safety, measured by crime rate, is also an important factor, which we will factor in for the six cities of Atlanta, Georgia; Boston, Massachusetts; Chicago, Illinois; Miami, Florida; Phoenix, Arizona; and Seattle, Washington.

This focus—the neighborhood context of affordable housing—has been a significant concern among policymakers. Federal urban policy puts community context (often termed "sustainability") front and center, tying housing goals to the need for neighborhoods with good access to services, lower transportation costs, and a healthy, walkable, and safe environment. Affordable housing advocates increasingly recognize the need to preserve affordability in locations that have walkable access to amenities and services, expanding beyond the assumption that low poverty alone should be the key locational factor for affordable housing (Fraser and Kick, 2007; Joseph, Chaskin, and Webber, 2007). The federal Moving to Opportunity for Fair Housing demonstration program, in which public housing residents were relocated to low-poverty neighborhoods, was based on the idea that greater access to opportunities would be essential (Briggs, 2008; Orr et al., 2003; Popkin, Levy, and Buron, 2009). Results were mixed, but a strong consensus emerged that the fight against poverty requires "a major national commitment to make rental housing affordable in safe, livable neighborhoods" (Briggs, Popkin, and Goering, 2010: 16).

Existing Research

We summarize some of the literature in this report, focusing on three areas: (1) the growing popularity of walkable neighborhoods; (2) walkable access, walkability, and walking; and (3) the neighborhood context of HUD-assisted housing. Our more detailed reviews and discussion of this growing literature can be found in Talen and Koschinsky (2014b, 2013).

Growing Popularity of Walkable Neighborhoods

Substantial advances have been made in recent years in the theoretical development of sustainable communities and urban form, including in the areas of walkability and transit access (Clemente et al., 2005; Farr, 2008; Frey, 1999; Jabareen, 2006; Mazmanian and Kraft, 1999; Van der Ryn and Calthorpe, 2008; Wheeler, 2005; Williams, Burton, and Jenks, 2000). These approaches have gained significant political and developer support.

In fact, an urban renaissance trend has been popularized in several recent nonacademic books, which received broad press coverage, with titles indicating the high hopes associated with urbanism. Examples include *The Option of Urbanism: Investing in a New American Dream* (Leinberger, 2009), *Walkable City: How Downtown Can Save America* (Speck, 2012), and *The Metropolitan Revolution: How Cities and Metros Are Fixing Our Broken Politics and Fragile Economy* (Katz, 2013). Changing dynamics in suburbs are discussed in recent books such as *Confronting Suburban Poverty in America* (Kneebone and Berube, 2013) and *The End of the Suburbs: Where the American Dream Is Moving* (Gallagher, 2013).

Population growth rates have recently increased in urban areas, and exurbs have been losing population. The total number of residents living in suburban (as opposed to urban) neighborhoods remains greater (Frey, 2012), however. Critics of high-density, mixed-use, accessible urban living build on this fact and argue that low-density, residential suburban living remains a preference for a sizable subset of the population that should not be ignored by urban renaissance advocates (Kotkin and Cox, 2013).

Actual demand for housing in neighborhoods with walkable access has been increasing in recent years. In 2009, 60 percent more households than in 1995 wanted to walk or bike to complete errands within less than 1 mile and 45 percent more wanted to walk or bike to work within 1 mile (Nelson, 2013; U.S. DOT, 2011, 2009). Most households (58 percent) now prefer living within walking distance to amenities to living in a sprawled community (NAR, 2013, 2011). Younger households (55 percent of 18- to 34-year-olds) and households with lower incomes (58 percent of households with less than 80 percent of Area Median Income as opposed to 44 percent with more than 120 percent of Area Median Income) are more likely to prefer living in mixed-use walkable neighborhoods (Nelson, 2013). The Urban Land Institute also found that 18- to 34-year-olds (*Millennials*, or Generation Y) prefer living in denser walkable neighborhoods where they can walk more and drive less (Lachman and Brett, 2013; also see The Rockefeller Foundation, 2014, for similar results). Even in "poster child for sprawl" cities like Atlanta, where only 1 percent of all neighborhoods are walkable, those areas accounted for 60 percent of growth in commercial and landlord-operated real estate from 2008 to 2012 (Leinberger and Austin, 2013).

Such housing remains in short supply or too costly, however, especially for low-income households. Although slightly less than one-fourth of all households would like to walk or bike to work (23 percent)[1] or to errands (22 percent), only a fraction of this demand is actually met (4 and 10 percent, respectively) (Nelson, 2013; Knudtsen and Schwartz, 2013, also find supply shortages). Leinberger (2009) also estimated an average supply of 5 to 10 percent of housing in walkable places. Adkins (2013) found that only 27 percent of low-income households with a preference for accessible neighborhoods were able to move to a very walkable area (compared with 53 percent of higher income households)—60 percent of low-income households found a new home in a somewhat walkable area (compared with 76 percent of higher income households). Although a recent national survey estimated that 94 percent of people were convinced of the positive health benefits of walking, 40 percent lived in neighborhoods that were "not at all" or "not very" walkable. Only 8 percent of children walk to school and 2 percent bike there (Fleury, 2013).

[1] The results of the 2011 American Housing Survey are similar. For nearly 20 percent of recent movers, "convenience to job" is the most important criterion in neighborhood choice (U.S. Census Bureau, 2013a).

Reflecting this supply gap, home values in walkable neighborhoods tend to be higher (Cortright, 2009; Knudtsen and Schwartz, 2013). Furthermore, urban home values have been increasing faster than suburban ones (Leinberger and Alfonzo, 2012). The authors also found that residents with higher incomes and education are much more likely to be able to afford life in a walkable neighborhood in the Washington, D.C. metropolitan area because these neighborhoods are associated with better market strength, higher home values, lower transportation costs, and better transit access. By contrast, less affluent residents with less educational attainment were more likely to live in areas in the Washington, D.C. area with poor walkability.

Walkable Access, Walkability, and Walking

Walkable access needs to be distinguished from the quality of the walkable environment (walkability) and the propensity for people to actually walk in these environments. This article focuses primarily on walkable access to amenities. We refer to *accessible* neighborhoods as those with walkable access (defined by walk scores; see the Data subsection). This focus is extended to address the question of the quality of the walkable environment (walkability) through the comparison of Walk Score data with qualitative measures of walkability. An accessible neighborhood (one with walkable access to amenities) is not necessarily walkable if the quality of the walking environment is not pedestrian friendly (for example, if it has no sidewalks). We rely on other research that addresses to what extent people actually walk in these environments. Furthermore, even when people are walking in accessible neighborhoods, the amenities they can reach do not necessarily translate into opportunities that can be used, for example, because of poor amenity quality or because of other barriers beyond physical access. Nevertheless, given research on the localized lives of low-income residents (Allard, 2009; Galster, 2014; Small, 2009), accessibility is pertinent.

Walkable access to amenities, the quality of the pedestrian environment, and the act of walking have seen increased interest in recent research and planning efforts. More than 400 articles have been published on topics related to walkable access and walkability (for reviews of this literature, see, for instance, Brownson et al., 2009; Ding and Gebel, 2011; Dunton et al., 2009; Durand et al., 2011; Ewing and Cervero, 2010; Feng et al., 2010; Heath et al., 2006; Saelens and Handy, 2008; Talen and Koschinsky, 2014b, 2013).

We use walk scores as a measure for walkable access. Walk Score includes two proxies for pedestrian friendliness (intersection density and average block length), but we do not use it as a proxy for pedestrian walking behavior. Note, however, that several recent studies validated walk scores as a useful proxy for walkability and for walking (Weinberger and Sweet, 2011). For instance, Duncan et al. (2011) and Carr, Dunsinger, and Marcus (2011; 2010) found evidence of statistically significant correlations between walk scores and other measures of neighborhood walkability. Brown et al. (2013) documented a significant 19-percent increase in the chance of purposive walking and a 12-percent increase in the chance of meeting the physical activity recommendations of recent Cuban immigrants for every 10-point increase in walk scores. Manaugh and El-Geneidy (2011)'s results also showed strong correlations between higher walk scores and more walking behavior.

Carr, Dunsinger, and Marcus (2010) also found positive correlations between walk scores and crime, suggesting that factors that compromise walkability are not well captured by Walk Score's

access measure. In addition, at least one study shows that neighborhood crime has an important negative association with health in low-income neighborhoods, whereas no association was found between crime and walkability in this study (DeGuzman, Merwin, and Bourguignon, 2013). Other evidence does show that residents in urban low-income housing, especially women, walk less in unsafe environments (Bennett et al., 2007). In other words, in neighborhoods where neighborhood quality is compromised, walkable access is less likely to represent opportunity access.

The Neighborhood Context of HUD-Assisted Housing

A comprehensive review of studies from the past two decades on the neighborhood context of HUD-assisted housing indicates that public housing residents have lived in the most disadvantaged neighborhoods, followed by tenants in project-assisted housing (such as LIHTC properties), followed by HCV holders (Galster, 2014). Early research (Newman and Schnare, 1997) is consistent with these more recent findings, showing that, despite the federal policy goal of providing a "suitable living environment" for HUD-assisted tenants, PBRA did not improve neighborhood conditions for low-income tenants, offered worse conditions for public housing residents, and only slightly improved the neighborhood context of voucher holders. Galster (2014) concluded that neither PBRA nor HCV significantly improved the neighborhood context compared with public housing tenants or unassisted tenants.

As we will show, HUD-assisted housing, especially project-based housing, creates advantages in terms of walkable access, with public housing being most accessible, followed by PBRA and HCVs. We then also examine the proportions of accessible neighborhoods that are and are not compromised by countervailing factors such as lower home values, racial segregation, and poor school quality. Galster (2014) also found few significant differences in the neighborhood context of HCV holders and tenants in project-based housing built and managed by private or nonprofit developers (subsidized, for example, through the LIHTC Program, Section 8 New Construction and Rehabilitation, or the Section 236 Mortgage Assistance Program). Furthermore, when voucher holders move out of their existing neighborhoods into low-poverty, less segregated neighborhoods, they often subsequently move back into worse neighborhoods than the ones in which they initially lived (Galster, 2014).

Even moreso than all low-income rental units, assisted rental units are more likely to be concentrated in neighborhoods with poor market strength, more racial segregation, and poor school quality, resulting in a spatial concentration of poverty (Basolo and Nguyen, 2005; Hirsch, 1998; Massey and Kanaiaupuni, 1992; Oakley and Burchfield, 2009). A combination of individual, structural, and programmatic reasons has contributed to this spatial concentration (Galster, 2014). Examples include the embeddedness of assisted tenants in highly localized social networks that restrict housing search information to the immediate disadvantaged surroundings, lower land prices in these areas, NIMBY (or "not in my backyard") opposition to assisted housing in wealthier areas, the reluctance of landlords to rent to subsidized tenants, racial discrimination, and housing program requirements to target high-need areas (Galster, 2014; Kawitzky et al., 2013; Khadduri, 2013; Oakley, 2008).

Traditional public housing projects built since the 1930s were constructed in a few areas as high-density superblock enclaves by local public housing authorities with federal funding. They tended

to be isolated from commercial activity and wealthier parts of the city and reinforce existing patterns of racialized poverty (Hirsch, 1998; Sugrue, 2005; Vale, 2000). Small-scale scattered-site programs to decentralize public housing started in the late 1960s but represent a minimal proportion (8 percent) of all public housing units and were more driven by court-ordered desegregation than a strong federal commitment to deconcentrating poverty (Galster, 2014). From 1994 through about 2004, the most dilapidated public housing was demolished and replaced by new decentralized, mixed-income units and HCVs through the HOPE VI program. Some evidence points to improved neighborhood quality for HOPE VI tenants (Zielenbach, 2003) although living in mixed-income neighborhoods can come with new forms of exclusion (Chaskin, 2013; Joseph, 2013).

Section 8 vouchers (created in 1974), now called housing choice vouchers, have been another mechanism with the potential for improving the neighborhood context of HUD-assisted tenants. In this program, tenants can use the voucher to cover the difference between their rental payment (30 percent of their income) and the full rental amount. This amount is bound by a payment standard set by the local public housing authority unless the tenant chooses to pay more than this standard. Two formidable barriers to using HCVs are obtaining a voucher from a local housing authority in the first place, because the waiting lists in many cities span multiple years or are closed, and finding a private or nonprofit landlord who will accept the voucher. By contrast with public housing, where public authorities decide to site the housing in a few locations, HCVs require tenants to search for leasing opportunities among a much more dispersed set of private units. Some evidence exists that voucher holders do end up living in neighborhoods with lower poverty levels than those from which they moved (Basolo, 2013; Pendall, 2000). Many tenants with vouchers end up reconcentrating, however, in moderate- to high-poverty areas that are often still segregated (Briggs, Popkin, and Goering, 2010; McClure, 2010). This tendency is partly related to rent subsidy limits set through the Fair Market Rents, a limited supply of affordable rental housing in high-opportunity areas and strong-market cities (DeFilippis and Wyly, 2008), discrimination, and inadequate information about rental opportunities (Briggs, Popkin, and Goering, 2010; McClure, 2010; Varady and Walker 2007, 2003). Because vacancy rates in high-opportunity areas are tight, given strong higher income demand, and disadvantaged areas have higher vacancy rates, the incentives to accept HCVs are much greater for landlords in neighborhoods with low rather than high opportunities (Galster, 2014).

Finally, LIHTC and other PBRA (such as Section 8, Section 202, and Section 811) provide subsidies to private and nonprofit developers in financing, building, and maintaining affordable rental housing. Because these projects are often multifamily housing, they are also more spatially concentrated than voucher-assisted units. By contrast with public housing, however, private and nonprofit developers make the siting decisions by taking market considerations into account. Several project-based programs (including LIHTC) contain expiring low-income use restrictions (for example, after 15 years), which can provide private developers with incentives to develop housing in strong-market areas and convert the units to market-rate rental units after the use restrictions expire. From a perspective of providing long-term affordable housing, this policy creates problems for preserving affordable housing in lower poverty neighborhoods. At the same time, program incentives to locate LIHTC units in high-need areas (such as “qualified census tracts” or “difficult development areas”) or to provide setasides for nonprofits targeting disadvantaged neighborhoods reinforce the concentration of tenants in poor, segregated neighborhoods (Galster, 2014).

Although debates between proponents of dispersed and place-based housing assistance abound, it is important to keep in mind the strong overlap between project- and tenant-based assistance (Galster, 2014; Williamson, Smith, and Strambi-Kramer, 2009). For instance, LIHTC projects are often made affordable to low-income tenants by packaging deals with HCVs. Some traditional public housing was replaced through HOPE VI using HCVs to move tenants to other locations. Finally, tenants facing expiring low-income use restrictions in PBRA were often "vouchered out" through HCVs. Hence, vouchers are often used to replace project-based housing or to finance affordable rents within PBRA units. Especially in the latter case, the neighborhood context of LIHTC and vouchers will be identical because the same tenant is subsidized through both project- and tenant-based assistance.

The geographic distribution of HUD-assisted housing in our research reflects the dynamics described in previous research. Project-based housing in the 359 U.S. metropolitan statistical areas (MSAs)[2] is very concentrated in a minimal proportion of neighborhoods, namely in 10 to 13 percent of neighborhoods (9 percent LIHTC, 10 percent public housing, and 13 percent PBRA). As we will show, about 60 percent of neighborhoods with project-based units (public housing, LIHTC, or PBRA) are in urban areas compared with 40 percent in suburban areas. Nearly one-half of all public housing units (46 percent) are in high-density urban neighborhoods (4 or more units per acre) compared with 36 to 37 percent of HCV, LIHTC, and PBRA units. By contrast, HCVs are much more dispersed across MSAs; voucher holders live in 73 percent of neighborhoods in MSAs, and only 40 percent of these neighborhoods are in urban areas as opposed to 60 percent in suburban areas. Within suburban areas, however, a higher share of HCV units is concentrated in high-density neighborhoods (4 or more units per acre) than the share of projects (16 compared with 13 to 14 percent). More than one type of project-based housing is frequently in the same neighborhood. About one-fourth (26 percent) of neighborhoods contain public housing, LIHTC, or PBRA units or a combination of the three. On the other hand, three-fourths of neighborhoods in MSAs do not have any of these units.

Data and Methods

This section provides an overview of the data sources and variables used in this article, followed by a discussion of the methodology applied to analyze these data.

Data

To conduct this analysis, we assembled data on HUD-assisted project- and tenant-based housing and the neighborhood context of this housing, including its walkable access, walkability, and neighborhood quality. The comprehensive dataset we collected includes current (2010 to 2012) neighborhood-scale information for all 359 MSAs in the United States. These data were derived from about a dozen sources, including HUD; Walk Score; local police; planning and housing departments; the Environmental Protection Agency (EPA); GreatSchools; InfoUSA; CoreLogic, Inc.; the 2010 census; the Home Mortgage Disclosure Act (HMDA; Walker and Winston, 2009); and the Internal Revenue Service (IRS; via Brookings Institution, 2012).

[2] Based on the 2003 Office of Management and Budget definition of metropolitan statistical areas (OMB, 2003).

We aggregated more than 20 million address-level records to the neighborhood level. In this study, a neighborhood is defined as a 2010 census block group, and we use the two terms synonymously. We created more than 100 variables to characterize walkable access, HUD-assisted housing, potential compromising factors, and other neighborhood characteristics. In addition, we collected more detailed data for six cities across the United States with different levels of walkable access: Atlanta, Boston, Chicago, Miami, Phoenix, and Seattle. This section details what data were collected and how the variables used in the analysis were created. Exhibit 1 summarizes the data sources and variables.

We are assessing the neighborhood context of 5,797,058 HUD-assisted rental units in the 359 MSAs of the United States. Of these units, most (65 percent) are project-based assisted housing and 35 percent consist of HCVs, or tenant-based rental assistance (2,045,005 units). The project-based subsidies fall into three groups.

1. Housing funded under the LIHTC Program (28 percent, or 1,642,731 units) and administered by the U.S. Treasury.
2. Housing funded under PBRA, including Section 202 and Section 811 housing for elderly and disabled residents, Section 236, and Section 8 New Construction/Rehabilitation (20 percent, or 1,148,070 units).
3. Public housing (traditional and HOPE VI; 17 percent, or 961,252 units). We are not able to differentiate HOPE VI from traditional public housing with the data we have.

To characterize walkability, we purchased or collected five sets of data.

1. From Walk Score, 220,000 walk scores (Front Seat, 2010) to measure walkable access to amenities from the center of all 174,186 neighborhoods in the 359 MSAs (as of February 2012). More accessible neighborhoods have higher residential population, business, and amenity density in nearby locations (within 0.25 miles of street distance).
2. Also from Walk Score, 31,000 transit scores for 170 cities to measure access (0.5 miles straight-line distance) to rail and bus service from a home, in this case the center of a 2010 census block group (as of February 2012).
3. Parcel-based land use and building characteristics, zoning, street characteristics, open space, bike lanes, and public transit data for the cities of Atlanta, Boston, Chicago, Miami, Phoenix, and Seattle (2012). These results are summarized in more detail in Talen, Koschinsky, and Lee (2014).
4. A comprehensive set of indicators of walkability for selected neighborhoods in Washington, D.C., that includes qualitative dimensions of the walking environment. Mariela Alfonzo aggregated the 162 indicators of the Irvine-Minnesota Inventory into the 10 dimensions of the State of Place index, including density, connectivity, aesthetics, form, physical activity facilities, personal safety, traffic safety, pedestrian amenities, proximity of uses, public spaces, and parks. The Irvine-Minnesota Inventory, including Larry Frank's metrics (Boarnet et al., 2006; Day et al., 2006) includes widely used metrics for measuring the quality of the pedestrian environment. These data include measures collected manually for other studies and additional data collected specifically for this study (2010 to 2012). We compared these results with walk scores. Koschinsky et al. (2014) analyzed these data in more depth.

Exhibit 1

Data Sources and Variable Description

Variable	Description	Year	Original Scale	Source
Neighborhoods	2010 census block groups in 359 metropolitan areas (average 1,473 people).	2010	174,186 block groups	2010 census
Regions (West, South, Midwest, Northeast)	West: AZ, CO, ID, MT, NV, NM, UT, WY, AK, CA, HI, OR and WA. South: DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK and TX. Midwest: IL, IN, MI, OH, WI, IA, KS, MN, MO, NE, ND and SD. Northeast: CT, ME, MA, NH, RI, VT, NJ, NY and PA.			U.S. Census Bureau
Walkscore and Components	Score from 0–100 that indicates how acessible amenities are within 0.25 miles street network distance from the center of each block group.	2012	215,000+ addresses	Walk Score
% Low Income	Percentage of tax filers who were eligible for the Earned Income Tax Credit.	2008	38,000+ ZIP Codes	Internal Revenue Service, via Brookings Institution
# Jobs	Number of employees in businesses.	2010	11.8 million addresses	Infogroup/ InfoUSA, via Esri Business Analyst
Distance to Reach Better vs. Worse School	Distance (meters) from block group centroid to closest high-performing school (ranking 9–10) minus distance (meters) from block group centroid to closest low-performing school (ranking 1–2).	2012	73,671 addresses	GreatSchools
Diversity	Simpson's diversity index for race/ethnicity (larger = more divese).	2010	174,186 block groups	2010 census
% Black, White, Hispanic	Number of African-Americans/population, Whites/population, and Hispanics/population.	2010	174,186 block groups	2010 census
Units	Housing units	2010	174,186 block groups	2010 census
Home Value	Estimated median single-family home values based on home loans.	2009	51,000+ 2000 census tracts	HMDA, via components of Urban Institute/ LISC's market strength index
% HUD Housing	Number of HUD-subsidized vouchers, LIHTC, public housing, and projects (TRACS)/all housing units	2012	4.6 million addresses	HUD, U.S. Census Bureau
% Renter	Number of renter-occupied units/housing units.	2010	174,186 block groups	2010 census
% Vacant	Number of vacant units/housing units.	2010	174,186 block groups	2010 census
% Tenant Vouchers	Number of tenant vouchers/housing units.	2012	2.1 million units (addresses)	
% LIHTC	Number of LIHTC units/housing units.	2012	1.6 million units (addresses)	
% Public Housing	Number of public housing units (traditional and HOPE VI)/housing units.	2012	961,000+ units (addresses)	HUD, U.S. Census Bureau
% Developers	Number of project-based units (TRACS)/housing units.	2012	1.15 million units (addresses)	

HDMA = Home Mortgage Disclosure Act. HUD = U.S. Department of Housing and Urban Development. LIHTC = low-income housing tax credit. LISC = Local Initiatives Support Corporation. TRACS = Tenant Rental Assistance Certification System.

5. We conducted a LEED-ND (Leadership in Energy & Environmental Design for Neighborhood Development; USGBC, 2009) analysis for all parcels in Phoenix (as of 2012) and compared the results with walk scores. The results of this analysis were published in Talen et al. (2013).

To measure neighborhood accessibility, we rely on so-called "street smart" walk scores, which include walking distances of 0.25 miles along streets to amenities (rather than straight-line distances) and measures of pedestrian friendliness (intersection density and average block length). Scores are based on walking distance to nine amenity categories: (1) grocery stores, (2) restaurants, (3) shopping places, (4) coffee stores, (5) banks, (6) parks, (7) schools, (8) book stores, and (9) entertainment, which are weighted (for example, grocery stores weigh more than banks and the more amenities in the same category the less they are weighted). The amenity scores are standardized to range between 0 and 100. Penalties for low intersection density and long block lengths are then added to this score. Five intervals help interpret the score: (1) 0 to 24 *Car-Dependent* (nearly all errands require a car); (2) 25 to 49 *Car-Dependent* (a few amenities within walking distance); (3) 50 to 69 *Somewhat Walkable* (some amenities within walking distance); (4) 70 to 89 *Very Walkable* (most errands can be accomplished on foot); and (5) 90 to 100 *Walker's Paradise* (daily errands do not require a car). Previous research like Moudon et al. (2006) and Front Seat (2010) influenced the choices underlying the street-smart walk scores.

In our national analyses, *accessibility* is defined as having walk score of 70 or higher. Inaccessible neighborhoods have walk scores of between 0 and 69. For our six-city analysis, we nuance accessibility further by differentiating neighborhoods with excellent access (90 to 100) from those with good access (70 to 89). Exhibit 2 shows aerial and street-view images of our six cities to illustrate differences in walkable access. Accessible areas have a greater diversity of land uses (for example, residential and commercial) than inaccessible areas, which can be predominantly residential. Although the car-dependent neighborhoods look more similar in the image samples of the six cities, the lower density in accessible areas in cities such as Phoenix and Atlanta contrasts with the higher densities in accessible areas in Boston, Chicago, or Seattle.

Two key measurement challenges are the quality and the choice of amenities. For instance, Walk Score currently ignores the quality of amenities, which is relevant because the same amenity access score in a richer and poorer community is likely to provide access to very different levels of quality of amenities. For instance, stores can be classified as grocery stores in both cases but represent a fully stocked supermarket in one case and a gas station corner store with primarily junk food in the other case. More walkable access to the latter could actually contribute to a decrease rather than an increase in health. Walk Score also prioritizes more affluent consumption amenities such as coffee shops, restaurants, and bars in its scoring system, whereas jobs, daycare, or healthcare services are not included. Our comparison of walk scores and the State of Place index (Koschinsky et al., 2014) analyzes these dynamics in more detail.

The "five Ds" of built environments that enable transportation options beyond car travel are diversity of land uses, density, design, distance to transit, and destination accessibility (Ewing and Cervero, 2010). In our analysis, diversity of land uses is assessed through parcel-based land use information for our six cities and extracted from business types for all neighborhoods in the country. Population density is computed based on 2010 census estimates. Design is measured

Exhibit 2

Aerial and Street-View Image Examples of Inaccessible and Accessible Neighborhoods in Six Cities

Note: Extracted from http://walkableneighborhoods.org/explore/cbsa/.

Sources: U.S. Department of Housing and Urban Development; Walk Score; 2010 census

through the manually collected Irvine-Minnesota Inventory and State of Place data for samples of neighborhoods in Washington, D.C. Distance to transit and destination accessibility are captured through walk scores, transit scores, and the LEED-ND analysis.

For a richer characterization of neighborhoods, we supplemented the measures of walkability with the following indicators of neighborhood quality.

1. **Home Values.** We purchased and obtained 1.5 million records of 2012 home sales addresses from CoreLogic. Because these data did not cover all neighborhoods, we also obtained 2009 median home values (2010 tract level) from HMDA (courtesy of Urban Institute).

2. **School Quality.** We purchased address-level school quality data from GreatSchools for public and private elementary, middle, and high schools across the United States (2012). These data contain performance scores for each school ranging from 1 (lowest score) to 10 (highest score). We computed the distance in meters from the block group centroid to the closest high-performing school (ranking 9 or 10) and to the closest low-performing school (ranking 1 or 2). For the national analyses, these distance variables were then recoded into 0-or-1 indicators for whether or not the closest school within 0.5 miles of a block group center was a low- or high-performing school.

3. **Businesses.** We used 11.8 million address-level records of businesses in the United States (2010) to create a national index of land use diversity (Simpson's index) and characterize the business context of neighborhoods.

4. **Housing Market Strength.** The Urban Institute used 2009 HMDA and other data to create an index of housing market strength at the 2010 census tract level and foreclosure risk at the 2011 ZIP Code level (Walker and Winston, 2009). We apply this housing market index to distinguish poorer market strength (the lowest quartile, 0 to 25 percent) from average or above average market strength (26 to 100 percent); that is, we would expect 25 percent of all neighborhoods to have poor market strength and 75 percent to have average or better market strength. Because we could not access these data at the block group level, block group centroids in the same tract or ZIP Code were assigned the same tract or ZIP Code value, which represents a limitation. In addition, we used 2010 census block group estimates for the percentage of rental units and vacant units.

5. **Socioeconomic Characteristics.** Reliable estimates of poverty and income unfortunately no longer exist at the block group level since the American Community Survey (ACS) replaced the 2000 census. ACS tract-level estimates (especially in poorer, more diverse urban areas) also have margins of errors that are greater than what we wanted to rely on in our analysis (see our separate working paper on uncertainty in ACS estimates—Folch et al., 2014). Home values and market strength characterize the economic conditions of a neighborhood to some extent but, because both data sources are based on sales of owner-occupied homes and urban lower income areas often have more rental units, these data sources are less accurate in exactly the neighborhoods at the heart of our analysis. Alternative sources are the percentage of tax filings with Earned Income Tax Credits (EITC) for IRS records (2008, via Brookings Institution, 2012) but these data are available only at the ZIP Code level and exclude households

without earned incomes.[3] We did use this variable in some analyses and assigned block group centroids to the EITC percentages of the ZIP Code they were in, which represents a limitation as in the case of the market strength and foreclosure risk variables. In addition, 2010 census block group data allowed for us to identify the percentages of African-American, Hispanic, Asian, and White residents in a neighborhood (and compute a Simpson's index of racial and ethnic diversity) and population density. We also collected data on violent and property crime from the police departments of the cities of Atlanta, Boston, Chicago, Miami, Phoenix, and Seattle.

6. **Environmental Disamenities.** We include the proximity to the center of a brownfield from the centroid of a census block group as a measure of the proximity to environmental disamenities. As with the school quality indicator, for the national analyses this distance variable was then recoded into a 0-or-1 indicator for whether or not a block group center was within 0.5 miles of a brownfield center.

Because we are interested in testing if walkable access is compromised by countervailing factors, we used the data sources described previously to create the following five variables in this context: (1) poor market strength (lowest quartile of distribution); (2) indicator of African-American segregation (40 or more percent African-American residents in a block group), (3) crime rates per thousand people, (4) proximity to low-performing schools, and (5) proximity to brownfields.

To differentiate urban, suburban, and rural areas, the following definitions are applied. The 2010 census defines 1,308 principal cities of MSAs or micropolitan statistical areas (U.S. Census Bureau, Geography Division, 2010: PCICBSA10 variable). These principal cities include cities, towns, villages, boroughs, and other municipalities. This analysis is based on the subset of 1,187 principal cities that the 2010 census identifies as cities; that is, excluding towns or villages (U.S. Census Bureau, Geography Division, 2010: LSAD10 variable). For purposes of this analysis, all other neighborhoods outside these cities but within the MSA or micropolitan statistical area are identified as suburban unless they contain rural housing units (U.S. Census Bureau, Geography Division, 2010: H2 variable).

Methods

This research sought to (1) provide a current national analysis of the walkable neighborhood context of project- and tenant-based HUD-assisted housing; (2) test if walkable access is compromised in low-income neighborhoods by countervailing factors such as poor market strength, poor school quality, segregation, crime, or environmental disamenities; and (3) compare automatically generated metrics of walkable access with more nuanced measures of the quality of the walkable environment. To characterize the neighborhood context, we used standard descriptive methods such as frequency tables, histograms, and other charts that enable us to compare the different housing programs for accessible and inaccessible neighborhoods (nationally, regionally, and for cities versus suburbs). To test for the presence of countervailing factors, we compute the proportion of units in each assisted housing program as opposed to all rental units in each of four categories—accessible or not and potentially compromised or not—for different geographic areas. We then statistically

[3] We also tested the percentage of low-wage workers (residential locations) from EPA's Smart Location Database (EPA, 2013) but ended up not including it because it was only weakly correlated with the EITC variable and had a spatial distribution in our six cities that did not match the patterns of poverty well. We are, however, using the workplace location of low-wage workers from this database.

test for differences between assisted and all rental units in each of these categories. Finally, to compare Walk Score's walkable access score with more qualitative measures of walkability, we collected detailed data for Phoenix (LEED-ND) and Washington D.C. (State of Place) and compared the results of onsite surveys with Google Street View inspections (Lee and Talen, 2014).

Given the variability between the 359 MSAs, we displayed the relationships of more than one dozen variables at the neighborhood and MSA levels for each MSA at a project website that allows for viewers to explore a particular urban area in more detail (http://walkableneighborhoods.org/explore/). Besides cross-tabulated maps of walkable access and neighborhood characteristics (including HUD-assisted housing), the website provides a new so-called *correlation circle* to visualize statistically significant bivariate correlations, for example among accessibility, HUD-assisted housing, and neighborhood quality for each MSA. It also contains street-view images of these combinations and aerial images of different combinations of access and housing programs for each MSA.

To distinguish when accessibility might have been compromised, we create a variable to identify neighborhoods that (1) have lower home values (less than the local MSA median), (2) are segregated (at least 40 percent African-American or Hispanic), and (3) have poor school quality (nearest school within 0.5 miles has a ranking of 1 or 2). About 6.4 percent of all neighborhoods fall into this group (the results were robust to different specifications). This variable allows for us to distinguish areas with lower and higher neighborhood quality, which can then also be compared with whether or not a neighborhood is accessible. Hence we generate four groups (good or poor access and compromised or not). We then calculate the number and percentage of units in each HUD program in each of the four categories (and compare this number with all renters and units because the baseline numbers are not equal in each of the four categories). We then run a simple *t*-test on proportions to test for significant differences between the proportions of assisted units as opposed to all rental units in each of the four categories for different geographic areas. These areas include all MSAs, the four census regions, urban and suburban areas, and our six selected cities.

In performing the analysis of the six cities (Talen and Koschinsky, 2014a), we focus on the subset of neighborhoods with greater proportions of HUD-assisted housing and then differentiate between accessible and inaccessible locations within this group (as the dependent variable). We estimate a model using binary logistic regression with independent variables that include neighborhood characteristics (including crime rate), as outlined in Talen and Koschinsky (2014a).

Results

In this section we present selected highlights of our findings. More detailed results can be found in Talen and Koschinsky (2014a); Koschinsky and Talen (2015); Koschinsky et al. (2014); and Talen, Koschinsky, and Lee (2014).

The Supply of Accessible Neighborhoods

Although demand for walkable neighborhoods has been increasing in recent years, such neighborhoods remain in short supply. The higher demand for accessible neighborhoods in our analysis based on 2010 census and Walk Score data is also reflected in lower vacancy rates in accessible

areas (8 percent) than in inaccessible areas (11 percent). Consistent with existing survey research, we also find that by far most neighborhoods are inaccessible. Only 14 percent of all neighborhoods (24,220) and 13 percent of all housing units (13.5 million) in MSAs have good walkable access (defined as having a walk score of at least 70). Given the strong relation between density (4 or more units per acre) and walkable access, this proportion is greater for rental units, at 23 percent (7.6 million), especially in the Northeast and West, and much less for owner units, at 7 percent (4.2 million). This difference reflects the greater proportion of owner-occupied units in less accessible suburbs and the greater number of rental units in more accessible urban locations.

The relationship between walkable access and income is not linear (accessibility increases with income) but bimodal (concentrations of access are found in both higher and lower income neighborhoods). To illustrate this point, we compare three levels of accessibility in neighborhoods with low- and high-income neighborhoods. We specifically distinguish poor access (walk scores of 0 to 69), good access (70 to 89), and excellent access (90 to 100) and group neighborhoods by the percentage of low-wage workers that are below and above the local MSA median; that is, 50 percent of all neighborhoods are in each group.[4] It turns out that the proportion of neighborhoods with excellent access is equal in both groups (2 percent), but higher income neighborhoods have a slightly higher proportion of good access than lower income areas (6 compared with 4 percent). In other words, of the 14 percent of neighborhoods that are accessible, 6 percent are in neighborhoods with more low-wage workers and 8 percent are in areas with more high-wage workers. The same result holds when other proxies of income are used, for example home values or market strength. As we will show, however, walkable access is more likely to be compromised in weak-market areas, which also contain more HUD-assisted housing.

Furthermore, in the six cities, we analyzed neighborhoods with higher neighborhood quality, defined as (1) above median housing market strength, (2) less racial segregation (less than 40 percent African-American), and (3) below median rates of property and violent crime (Talen, Koschinsky, and Lee, 2014). In addition, we used street characteristics, land use information, and zoning information to characterize the walkability of neighborhoods beyond walkable access. Overall, block groups with higher neighborhood quality are not necessarily walkable neighborhoods. HCVs generally have higher neighborhood quality than assisted project-based units. As the second most walkable city in the United States, Boston is the only city of the six we studied in depth where most of the areas with higher neighborhood quality are also walkable. This condition is also true for walkable neighborhoods with projects and vouchers in Boston (for example, in walkable residential or bikeable residential, mixed-use clusters). The Western and Southern cities of Miami, Phoenix, and Seattle have fewer walkable neighborhoods to begin with. In these cities, a, greater proportion of higher quality neighborhoods with projects and vouchers is inaccessible rather than accessible.

The Northeast and West are most accessible (31 and 15 percent of all neighborhoods, respectively), with the South and parts of the Midwest lagging (5 and 9 percent, respectively). Because the Northeast and West have more accessible neighborhoods, these regions also account for greater proportions of accessible HUD-assisted housing, particularly in the largest U.S. cities, New York City and Los Angeles, California. In all four census regions, walkable access is greatest (in both

[4] We use the variable *Percent Low Wage Workers* (E_PctLowWage) of EPA's Smart Location Database (EPA, 2013), which is based on workplace locations of workers earning $1,250 or less per month. Because the residential location variable is missing Massachusetts, we were unable to use this variable for our remaining national analysis.

cities and suburbs) in neighborhoods with more than 4 units per acre. Across all MSAs, 45 percent of all units in dense urban neighborhoods (4 or more units per acre) are accessible compared with 20 percent of these units in suburban areas. In the Northeast (where New York City dominates the results), 77 percent of units in dense areas are accessible in cities and 39 percent are accessible in suburbs. This proportion is by far the greatest in the country. In the West, 37 percent of units in dense cities and 17 percent in dense suburbs are accessible, with lesser proportions in the Midwest and South.

Older MSAs in the Northeast and Midwest are more walkable than newer ones in the South and West. These older MSAs also have been growing at lower rates than newer but less accessible MSAs, however; of the 100 largest MSAs in the United States, we analyzed walkable access in the 10 with the fastest and slowest population growth.[5] The slower growing MSAs in the Midwest and Northeast are twice as accessible as the faster growing MSAs in the South and West (15 compared with 7 percent of all rental units).

The five MSAs with the greatest proportion of accessible neighborhoods in the country are New York-Newark-Edison, NY-NJ-PA; San Francisco-Oakland-Fremont, CA; Los Angeles-Long Beach-Santa Ana, CA; Boston-Cambridge-Quincy, MA-NH; and Chicago-Naperville-Joliet, IL-IN-WI. In this group, New York-Newark-Edison has the greatest proportion of HUD-assisted units in accessible areas (79 percent), followed by Boston-Cambridge-Quincy (58 percent). Of the six cities we analyzed in more depth, Boston has the greatest proportion of walkable neighborhoods and HUD-assisted housing in walkable areas (31 and 58 percent, respectively), followed by Chicago (27 and 38 percent), Seattle (17 and 36 percent), and Miami (13 and 22 percent). In all these cities, public housing is the most accessible, followed by PBRA and HCV housing. Given that Atlanta and Phoenix are among the most sprawled MSAs in the country, they have few accessible neighborhoods and therefore also few HUD-assisted units in walkable areas (3 and 10 percent in Atlanta compared with 3 and 6 percent in Phoenix). In these two MSAs, PBRA units are more accessible than public housing, followed by HCVs.

Nationwide, the most accessible areas are positively, strongly, and significantly (at the .05 level) correlated with housing market strength and negatively correlated with HUD-assisted housing, low income, foreclosure risk, and distance to schools (with stronger correlations to the best schools). These areas are also positively correlated with percent White and percent Asian-American but negatively correlated with percent African-American (strongly) and percent Hispanic (weakly). Finally, across all MSAs, HUD-assisted housing is positively correlated with car-dependent and not very accessible areas, percent low income, and foreclosure risk and negatively correlated with high accessibility, housing market strength, and distance to schools (that is, closer distances, especially to the worst schools).

[5] The 10 MSAs with slowest population growth were Akron, OH; Buffalo-Cheektowaga-Tonawanda, NY; Cleveland-Elyria-Mentor, OH; Detroit-Warren-Livonia, MI; New Haven-Milford, CT; Providence-New Bedford-Fall River, RI-MA; Scranton--Wilkes-Barre, PA; Syracuse, NY; Toledo, OH; and Youngstown-Warren-Boardman, OH-PA. The 10 MSAs with fastest population growth were Austin-Round Rock, TX; Cape Coral-Fort Myers, FL; Charleston-North Charleston, SC; Dallas-Fort Worth-Arlington, TX; Houston-Baytown-Sugar Land, TX; McAllen-Edinburg-Pharr, TX; Orlando, FL; Provo-Orem, UT; Raleigh-Cary, NC; and San Antonio, TX. MSA population estimates were obtained from U.S. Census Bureau (2013b). Edits based on 2009 OMB definitions.

Accessibility of Project- and Tenant-Based HUD Programs

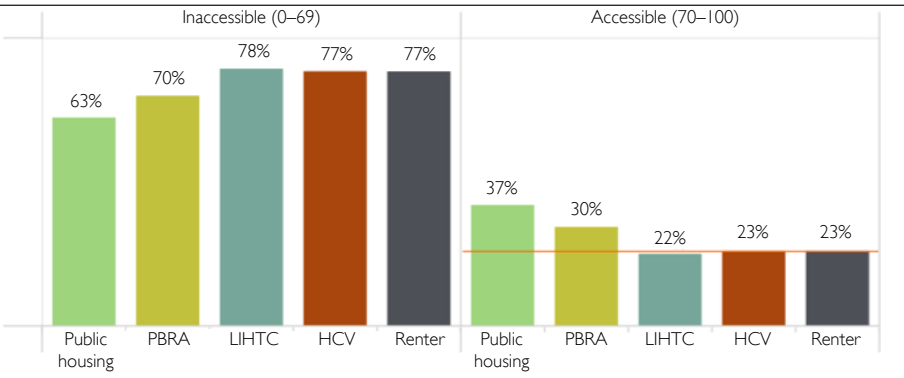
As mentioned previously, tenant-based voucher units are much more geographically dispersed than HUD-assisted project-based units. Whereas three-fourths (74 percent) of all neighborhoods in MSAs contain at least one HCV unit, only 9 to 13 percent of neighborhoods in MSAs contain at least one project-based unit. This distribution is related to the fact that about 60 percent of voucher holders live in suburban neighborhoods compared with 40 percent in principal cities. This proportion is exactly reversed for public housing (60 percent urban and 40 percent suburban) and evenly split (50 percent each) for PBRA and LIHTC units.

As the literature review demonstrated, public housing has historically been in the most disadvantaged neighborhoods, followed by other project-based housing (PBRA and LIHTC) and HCVs. Walkable access of HUD-assisted housing is more prevalent for public and PRBA housing than for LIHTC and HCV units. On average, a greater proportion of public housing units (37 percent) and PBRA housing units (30 percent) are accessible than LIHTC units and tenant-based vouchers. By comparison, the latter two programs are closer to the average percentage (23 percent) of all accessible rental units (exhibit 3). The same is true for transit access for those cities with transit data, where 53 percent of public housing tenants and 41 percent of PBRA tenants have good access (transit score of 70 to 100) compared with 37 percent LIHTC tenants and 31 percent of HCV tenants, which is closer to the transit access of all renters (33 percent). HCV-subsidized rental units, however, actually represent the greatest number (as opposed to proportion) of HUD-assisted units with walkable access (463,335 compared with about 340,000 to 360,000 project-based units with walkable access).

As is the case with all rental units, however, most HUD-assisted units are in inaccessible neighborhoods (63 percent for public housing, 70 percent for PBRA, and 77 to 78 percent for HCVs and LIHTC), especially in the South and Midwest. MSAs with more accessible neighborhoods unsurprisingly also tend to have more HUD-assisted housing with walkable access.

Exhibit 3

Walkable Access by HUD-Assisted Housing Type and All Renters



HCV = housing choice voucher. HUD = U.S. Department of Housing and Urban Development. LIHTC = low-income housing tax credit. PBRA = project-based rental assistance.

Notes: 359 metropolitan areas. The horizontal line on the right side of the exhibit represents the 23-percent share of all renter-occupied units in the United States with walkable access.

Sources: HUD; Walk Score; 2010 census

Tradeoffs With Walkable Access

In this section, we examine accessible neighborhoods with HUD-assisted housing in relation to tradeoffs such as poor market strength, crime, segregation, poor school quality, and environmental disamenities. We described previously that a greater proportion of tenants in place-based HUD-assisted housing live in walkable neighborhoods as compared with HCV holders. For all HUD-assisted tenants, a significant proportion of units in these walkable neighborhoods is not compromised by the countervailing factors we identified (17 to 24 percent compared with 20 percent for all rental units). At the same time, a subset of HUD-assisted housing is generally more likely than all rental units to be in areas with lower home values, more segregation, and poorer school quality (5 to 12 percent compared with 3 percent for all rentals). We first discuss accessibility in regards to separate compromising factors and then analyze it in relation to three combined factors.

Weaker Housing Markets

How do accessible neighborhoods with HUD-assisted housing fare economically? Not surprisingly, given findings from previous studies, the proportion of residents with low incomes (measured by the percentage of tax filings with EITC) is greater in neighborhoods with HUD-assisted housing than in areas without such housing. Median home values, and housing market strength generally, are correspondingly lower in neighborhoods with HUD-assisted housing than in those without it. They are lowest in neighborhoods with public housing, particularly in inaccessible neighborhoods. Across all housing programs, home prices are also higher in accessible than in inaccessible neighborhoods (a finding that is consistent with our analysis of six cities; see Talen and Koschinsky, 2014a). Accessible neighborhoods with HCV units have the highest median home values ($212,000), followed by neighborhoods with PBRA ($206,271), LIHTC ($192,000), and public housing ($164,000) units. Neighborhoods with HCV units have the lowest share of accessible neighborhoods in urban areas of all housing programs (75 percent for HCV neighborhoods compared with 80 to 84 percent for project areas). As shown previously, however, the relationship between walkable access and income or market strength is more bimodal than linear, with concentrations of accessible neighborhoods found in higher and lower income areas. Furthermore, areas that are most accessible (urban cores) and inaccessible (such as outer-ring suburbs) have higher home values, fewer low-income residents, and better market strength (exhibit 4 reflects some of these dynamics; see the percent EITC and market strength variables for accessible as opposed to inaccessible areas without assisted housing).

To address this question further, we sorted all neighborhoods from poor to good housing market strength and then grouped them into two categories: (1) poor market strength (weakest 25 percent of all areas) and (2) average-to-good market strength (remaining areas; that is, 25 to 100 percent). We would therefore expect 25 percent of all neighborhoods (accessible and inaccessible) to be in the poor market strength category and 75 percent in the average-to-good market strength group. All HUD-assisted units unsurprisingly have greater proportions in poor market strength areas than this expected 25-percent threshold. Public housing has the greatest proportion in these neighborhoods (47 percent), followed by HCV (43 percent), LIHTC (37 percent), and PBRA (36 percent) units. Public housing also has the greatest proportion of units in accessible neighborhoods among those programs (37 percent), and 24 percent of these neighborhoods have average or better

Exhibit 4

Characteristics of Neighborhoods With and Without HUD-Assisted Housing, by Program Type and Access Level (1 of 3)

	Neighborhoods (#)	Neighborhoods (%)	Subs Units (#)	Subs Units (%)	Median Home Value ($)	Housing Market Strength	Avg. Units/ Acre	% Urban
HCV in neighborhoods that are—								
Accessible with vouchers	20,126	12	463,335	23	212,000	– 0.21	20.2	75
Accessible without vouchers	4,109	2	—		300,000	0.62	32.8	80
Inaccessible with vouchers	107,624	62	—		134,000	– 0.16	3.3	39
Inaccessible without vouchers	42,327	24	1,581,670	77	180,000	0.56	1.9	22
Project-based rental assistance in neighborhoods that are—								
Accessible with project-based housing	5,593	3	344,411	30	206,271	– 0.14	23.3	80
Accessible without project-based housing	18,642	11	—		232,000	– 0.05	22.1	75
Inaccessible with project-based housing	17,919	10	—		124,000	– 0.29	3.5	44
Inaccessible without project-based housing	132,032	76	803,659	70	148,000	0.09	2.8	33
Public housing in neighborhoods that are—								
Accessible with public housing	3,657	2	353,935	37	164,000	– 0.42	19.7	84
Accessible without public housing	20,578	12	—		238,000	– 0.01	22.8	74
Inaccessible with public housing	13,398	8	—		105,000	– 0.52	3.7	59
Inaccessible without public housing	136,553	78	607,317	63	150,000	0.10	2.8	32
LIHTC in neighborhoods that are—								
Accessible with LIHTC	3,805	2	358,586	22	192,000	– 0.23	24.3	83
Accessible without LIHTC	20,430	12	—		233,000	– 0.04	22	75
Inaccessible with LIHTC	12,268	7	—		121,000	– 0.33	3.4	44
Inaccessible without LIHTC	137,683	79	1,284,145	78	148,000	0.07	2.9	33
All HUD housing in neighborhoods that are—								
Accessible with subs housing	20,935	12	1,551,883	27	214,000	– 0.18	20.7	75
Accessible without subs housing	3,300	2	—		319,000	0.62	32.8	79
Inaccessible with subs housing	110,921	64	—		134,000	– 0.15	3.2	38
Inaccessible without subs housing	39,030	22	4,301,498	73	183,000	0.59	1.9	22
Accessible (WS = 70–100)	24,220	14			225,000	– 0.07	22.3	76
Inaccessible (WS = 0–69)	149,933	86			145,000	0.04	2.9	34

Exhibit 4

Characteristics of Neighborhoods With and Without HUD-Assisted Housing, by Program Type and Access Level (2 of 3)

	Within 0.5 Miles of LP School (#)	Within 0.5 Miles of LP School (%)	Within 0.5 Miles of HP School (#)	Within 0.5 Miles of HP School (#)	Within 0.5 Miles of Brownfield (#)	Within 0.5 Miles of Brownfield (%)
HCV in neighborhoods that are—						
Accessible with vouchers	9,085	45	3,407	17	4,146	21
Accessible without vouchers	1,295	32	1,569	38	466	11
Inaccessible with vouchers	15,712	15	7,016	7	6,984	6
Inaccessible without vouchers	1,021	2	5,360	13	615	1
Project-based rental assistance in neighborhoods that are—						
Accessible with project-based housing	3,044	54	995	18	1,617	29
Accessible without project-based housing	7,336	39	3,981	21	2,995	16
Inaccessible with project-based housing	3,530	20	1,143	6	1,822	10
Inaccessible without project-based housing	13,203	10	11,233	9	5,777	4
Public housing in neighborhoods that are—						
Accessible with public housing	2,307	63	570	16	3,657	34
Accessible without public housing	8,073	39	4,406	21	20,578	16
Inaccessible with public housing	3,618	27	708	5	13,398	14
Inaccessible without public housing	13,115	10	11,668	9	136,553	4
LIHTC in neighborhoods that are—						
Accessible with LIHTC	2,334	61	638	17	1,292	34
Accessible without LIHTC	8,046	39	4,338	21	3,320	16
Inaccessible with LIHTC	2,478	20	567	5	1,364	11
Inaccessible without LIHTC	14,255	10	11,809	9	6,235	5
All HUD housing in neighborhoods that are—						
Accessible with subs housing	9,487	45	3,662	17	4,311	21
Accessible without subs housing	893	27	1,314	40	301	9
Inaccessible with subs housing	15,916	14	7,327	7	7,116	6
Inaccessible without subs housing	817	2	5,049	13	483	1
Accessible (WS = 70–100)	10,380	43	4,976	21	4,612	5
Inaccessible (WS = 0–69)	16,733	11	12,376	8	7,599	19

Exhibit 4

Characteristics of Neighborhoods With and Without HUD-Assisted Housing, by Program Type and Access Level (3 of 3)

	% African-American	African-American Segregated (40%+) (#)	African-American Segregated (40%+) (%)	% Hispanic	% White	Median EITC (%)
HCV in neighborhoods that are—						
Accessible with vouchers	20	3,867	19	18	52	21
Accessible without vouchers	8	229	6	12	71	10
Inaccessible with vouchers	16	16,017	15	11	68	17
Inaccessible without vouchers	5	843	2	7	84	10
Project-based rental assistance in neighborhoods that are—						
Accessible with project-based housing	25	1,417	25	17	48	23
Accessible without project-based housing	16	2,679	14	17	57	18
Inaccessible with project-based housing	22	4,316	24	10	63	19
Inaccessible without project-based housing	12	12,544	10	10	74	15
Public housing in neighborhoods that are—						
Accessible with public housing	32	1,263	35	17	45	23
Accessible without public housing	16	2,833	14	17	57	18
Inaccessible with public housing	25	3,739	28	11	59	22
Inaccessible without public housing	12	13,121	10	10	74	15
LIHTC in neighborhoods that are—						
Accessible with LIHTC	29	1,183	31	18	45	24
Accessible without LIHTC	16	2,913	14	17	57	18
Inaccessible with LIHTC	22	3,186	26	10	61	20
Inaccessible without LIHTC	12	13,674	10	10	74	15
All HUD housing in neighborhoods that are—						
Accessible with subs housing	20	4,034	19	18	52	20
Accessible without subs housing	5	62	2	11	76	9
Inaccessible with subs housing	15	16,241	15	11	69	17
Inaccessible without subs housing	5	619	2	7	84	10
Accessible (WS = 70–100)	2	4,096	17	2	6	19
Inaccessible (WS = 0–69)	11	16,860	11	9	64	15

Avg. = average. EITC = Earned Income Tax Credit. HCV = housing choice voucher. HP = high-performing. HUD = U.S. Department of Housing and Urban Development. LIHTC = low-income housing tax credit. LP = low-performing. PBRA = project-based rental assistance. Subs = subsidized.

market strength (compared with 16 percent in this category for all renters). It also has the greatest proportion of all programs in inaccessible poorer market-strength areas (34 percent), however. By contrast, all other programs' greatest proportion of units is in areas that are inaccessible but with average or better market strength (44 percent HCV and PBRA and 49 percent LIHTC) compared with 55 percent for all rental units.

Crime

Our descriptive analysis reveals that, on average, accessible neighborhoods in general tend to have higher rates of violent and property crime than inaccessible areas (except in Chicago) but that these rates are significantly higher in accessible neighborhoods with HUD-assisted housing. In other words, evidence exists that walkable access is compromised by crime for HUD-assisted households—except in Chicago, where much HUD-assisted housing is concentrated in inaccessible neighborhoods. In the five cities (excluding Chicago), violent crime rates per 1,000 people are highest in neighborhoods with any LIHTC units (23.1 for accessible areas compared with 13.4 for inaccessible areas) or any PBRA units (21.5 compared with 11.5), followed by those with any HCVs or public housing (15.3 compared with 7.9). The same pattern emerges for property crimes.

Controlling for other neighborhood characteristics in a multivariate regression context, however, another story emerges. Talen and Koschinsky's (2014a) logit regression model finds that Chicago is the only city where violent crime is strongly associated with high-access, high-subsidized locations. This association, importantly, is not true for public housing residents in Chicago, however. The same study of the six cities found that, in Atlanta, HUD-assisted units in high-access locations have higher crime rates. For all cities combined, the violent crime rate is lower in areas with excellent (walk score of 90 to 100) and poor (walk score of 0 to 69) access and higher in areas with good access (walk score of 70 to 89). For property crime, high-access areas have a lower crime rate than low-access areas.

Segregation

In all neighborhoods with HUD-assisted housing, the proportion of African-American residents is at least twice as great as in neighborhoods without such housing. This African-American concentration is especially true for neighborhoods with public housing. The share of Hispanic residents in neighborhoods with and without HUD-assisted housing is similar (in both accessible and inaccessible areas), although slightly greater proportions of Hispanic residents are present in neighborhoods with than without HCV holders. The proportion of White residents is less in neighborhoods with any type of HUD-assisted housing (exhibit 4).

To address the extent to which walkable access is compromised by segregation, we look at the proportion of accessible neighborhoods that are segregated (defined as 40 or more percent African-American) and that contain HUD-assisted housing of the different types (exhibit 4). For all HUD programs, accessible neighborhoods with assisted housing are the most segregated; that is, they have higher shares of segregation than accessible areas without assisted housing and inaccessible neighborhoods with or without subsidies. Neighborhoods with public housing are the most segregated (35 percent for accessible and 28 percent for inaccessible areas), and neighborhoods with HCV holders are the least segregated (19 and 15 percent, respectively), with LIHTC closer

to public housing and PBRA more similar to HCVs. As before, because the number of inaccessible neighborhoods is so much greater than the number of accessible ones, more segregated neighborhoods are inaccessible than accessible.

The six-city regression results of Talen and Koschinsky (2014a) found that segregation compromises good access in Atlanta, Boston, and Chicago, but not in Miami, Phoenix, and Seattle.

Lower School Quality

Accessible rental units will by definition be closer to both better and worse schools than units in inaccessible areas. Walkable neighborhoods with HUD-assisted housing have disproportionately more access to low-performing schools (with scores 1 or 2) than accessible neighborhoods without HUD-assisted housing (exhibit 4), however. Furthermore, a comparison between project- and tenant-based housing programs shows that this problem is greater for projects than for HCVs. Most walkable neighborhoods with project units are near low-performing schools (63 percent for neighborhoods with public housing, 61 percent for LIHTC, and 54 percent for PBRA compared with 39 percent of neighborhoods without any project housing). Although accessible neighborhoods with HCV units are still closer to low-performing schools than those without HCV units (45 compared with 32 percent), this 45-percent share is notably less than that of accessible neighborhoods with projects. Even when both accessible and inaccessible neighborhoods are considered, 90 percent of neighborhoods with public housing are within 0.5 mile of a low-performing school compared with 82 percent of neighborhoods with LIHTC and 74 percent of neighborhoods with PBRA units but a comparatively less 60 percent of accessible or inaccessible neighborhoods with HCV units. Nevertheless, when it comes to proximity to high-performing schools (with scores of 9 or 10), little difference exists between neighborhoods with HCV units and projects, whether they are accessible (about 17 percent) or not (5 to 7 percent). As expected, neighborhoods without assisted housing do have better access.

Environmental Disamenities

Finally, residents in accessible neighborhoods with HUD-assisted housing are more likely than residents in accessible neighborhoods without such housing to live near environmental disamenities like brownfields. This likelihood is true more for accessible neighborhoods with project-based assistance (29 percent for PBRA and 34 percent for public and LIHTC housing) than for those with HCV units (21 percent, like all neighborhoods), which are more dispersed. Of the four HUD programs we are comparing, LIHTC and public housing residents are most likely to live near brownfields (exhibit 4).

Combined Compromising Factors

As mentioned previously, we also compare a combined measure of multiple compromising factors with neighborhood accessibility. We assume neighborhood quality is compromised in areas with home values below the median, high rates (40 or more percent) of African-American or Hispanic segregation, and where the closest school within 0.5 miles is of poor quality. As before, neighborhoods with walkable access have walk scores of at least 70. We compare the proportion of units, in accessible as opposed to inaccessible neighborhoods with and without compromising factors, for HUD-assisted units with those of all rental units. All the differences between assisted and all rental units in the following discussion are statistically significant at the .001 level and refer to results presented in exhibits 5 and 6.

Exhibit 5

Proportions of Units, by Accessibility, Compromised or Not, for Different Areas (1 of 2)

All MSAs

Number of units in each of four compromise-access categories

Compromised?	Walk Score	PubHsg	PBRA	LIHTC	HCV	Renters	Units
No	Inaccessible	482,330	699,830	1,137,043	1,375,655	24,306,040	89,615,275
No	Accessible	235,076	272,595	281,934	360,456	6,650,436	11,976,775
Yes	Inaccessible	124,987	103,829	147,102	206,015	1,576,760	3,510,451
Yes	Accessible	118,859	71,816	76,652	102,879	963,001	1,560,023

Percent of units in each of four compromise-access categories

Compromised?	Walk Score	PubHsg	PBRA	LIHTC	HCV	Renters	Units
No	Inaccessible	50%	61%	69%	67%	73%	84%
No	Accessible	24%	24%	17%	18%	20%	11%
Yes	Inaccessible	13%	9%	9%	10%	5%	3%
Yes	Accessible	12%	6%	5%	5%	3%	1%

All MSAs—Cities and Suburbs

Number of units in each of four compromise-access categories

Compromised?	Walk Score	City-Suburb	PubHsg	PBRA	LIHTC	HCV	Renters	Units
No	Inaccessible	Suburb	209,337	379,498	627,534	724,736	14,632,491	62,863,824
No	Inaccessible	City	272,993	320,332	509,509	650,919	9,673,549	26,751,451
No	Accessible	Suburb	40,978	55,346	45,238	87,790	1,476,719	2,889,730
No	Accessible	City	194,098	217,249	236,696	272,666	5,173,717	9,087,045
Yes	Inaccessible	Suburb	18,448	22,870	36,725	55,383	420,129	985,004
Yes	Inaccessible	City	106,539	80,959	110,377	150,632	1,156,631	2,525,447
Yes	Accessible	Suburb	8,276	10,921	6,581	16,008	148,978	240,384
Yes	Accessible	City	110,583	60,895	70,071	86,871	814,023	1,319,639

Percent of units in each of four compromise-access categories

Compromised?	Walk Score	City-Suburb	PubHsg	PBRA	LIHTC	HCV	Renters	Units
No	Inaccessible	Suburb	76%	81%	88%	82%	88%	94%
No	Inaccessible	City	40%	47%	55%	56%	58%	67%
No	Accessible	Suburb	15%	12%	6%	10%	9%	4%
No	Accessible	City	28%	32%	26%	23%	31%	23%
Yes	Inaccessible	Suburb	7%	5%	5%	6%	3%	1%
Yes	Inaccessible	City	16%	12%	12%	13%	7%	6%
Yes	Accessible	Suburb	3%	2%	0.9%	2%	0.9%	0.4%
Yes	Accessible	City	16%	9%	8%	7%	5%	3%

All MSAs—Regions

Number of units in each of four compromise-access categories

Compromised?	Walk Score	Regions	PubHsg	PBRA	LIHTC	HCV	Renters	Units
No	Inaccessible	Midwest	2,963	4,520	5,184	7,041	76,371	224,891
No	Inaccessible	Northeast	58	2,366	1,673	1,571	16,830	36,476
No	Inaccessible	South	4,039	4,031	11,599	5,554	77,980	195,897
No	Inaccessible	West	4,373	3,841	7,390	7,523	234,760	671,168
No	Accessible	Midwest	9,317	15,459	13,120	10,338	358,396	724,530
No	Accessible	Northeast	5,789	12,356	11,893	6,132	105,038	172,911
No	Accessible	South	3,660	4,150	7,336	3,501	86,854	158,212
No	Accessible	West	4,734	3,378	9,923	3,040	113,476	217,931
Yes	Inaccessible	Midwest	2,277	5,660	5,736	9,964	62,896	139,866
Yes	Inaccessible	Northeast	574	616	1,139	1,751	7,667	14,365
Yes	Inaccessible	South	2,787	2,025	8,469	3,848	25,984	51,376
Yes	Inaccessible	West	578	88	1,031	405	7,022	16,366
Yes	Accessible	Midwest	903	2,613	4,070	7,449	57,263	105,929
Yes	Accessible	Northeast	3,482	5,865	5,409	5,479	32,009	47,661
Yes	Accessible	South	502	226	2,430	385	7,325	10,997
Yes	Accessible	West	102	0	552	83	1,057	2,204

Percent of units in each of four compromise-access categories

Compromised?	Walk Score	Regions	PubHsg	PBRA	LIHTC	HCV	Renters	Units
No	Inaccessible	Midwest	19%	16%	18%	20%	14%	19%
No	Inaccessible	Northeast	1%	11%	8%	11%	10%	13%
No	Inaccessible	South	37%	39%	39%	42%	39%	47%
No	Inaccessible	West	45%	53%	39%	68%	66%	74%
No	Accessible	Midwest	60%	55%	47%	30%	65%	61%
No	Accessible	Northeast	58%	58%	59%	41%	65%	64%
No	Accessible	South	33%	40%	25%	26%	44%	38%
No	Accessible	West	48%	46%	53%	28%	32%	24%
Yes	Inaccessible	Midwest	15%	20%	20%	29%	11%	12%
Yes	Inaccessible	Northeast	6%	3%	6%	12%	5%	5%
Yes	Inaccessible	South	25%	19%	28%	29%	13%	12%
Yes	Inaccessible	West	6%	1%	5%	4%	2%	2%
Yes	Accessible	Midwest	6%	9%	14%	21%	10%	9%
Yes	Accessible	Northeast	35%	28%	27%	37%	20%	18%
Yes	Accessible	South	5%	2%	8%	3%	4%	3%
Yes	Accessible	West	1%	0%	3%	1%	0.1%	0.1%

Exhibit 5

Proportions of Units, by Accessibility, Compromised or Not, for Different Areas (2 of 2)

Six Cities

Number of units in each of four compromise-access categories

Compromised?	Walk Score	Six Cities	PubHsg	PBRA	LIHTC	HCV	Renters	Units
No	Inaccessible	Atlanta	2,858	3,149	10,911	4,702	55,221	148,502
No	Inaccessible	Boston	58	2,366	1,673	1,571	16,830	36,476
No	Inaccessible	Chicago	2,963	4,520	5,184	7,041	76,371	224,891
No	Inaccessible	Miami	1,181	882	688	852	22,759	47,395
No	Inaccessible	Phoenix	2,368	3,222	4,592	5,041	196,918	557,283
No	Inaccessible	Seattle	2,005	619	2,798	2,482	37,842	113,885
No	Accessible	Atlanta	1,120	2,112	3,732	382	21,945	46,523
No	Accessible	Boston	5,789	12,356	11,893	6,132	105,038	172,911
No	Accessible	Chicago	9,317	15,459	13,120	10,338	358,396	724,530
No	Accessible	Miami	2,540	2,038	3,604	3,119	64,909	111,689
No	Accessible	Phoenix	6	594	859	210	12,660	24,468
No	Accessible	Seattle	4,728	2,784	9,064	2,830	100,816	193,463
Yes	Inaccessible	Atlanta	951	1,777	7,087	2,812	16,694	35,331
Yes	Inaccessible	Boston	574	616	1,139	1,751	7,667	14,365
Yes	Inaccessible	Chicago	2,277	5,660	5,736	9,964	62,896	139,866
Yes	Inaccessible	Miami	1,836	248	1,382	1,036	9,290	16,045
Yes	Inaccessible	Phoenix	578	88	667	267	6,424	15,533
Yes	Inaccessible	Seattle	0	0	364	138	598	833
Yes	Accessible	Atlanta	161	5	884	8	1,347	2,029
Yes	Accessible	Boston	3,482	5,865	5,409	5,479	32,009	47,661
Yes	Accessible	Chicago	903	2,613	4,070	7,449	57,263	105,929
Yes	Accessible	Miami	341	221	1,546	377	5,978	8,968
Yes	Accessible	Phoenix	0	0	0	10	718	1,707
Yes	Accessible	Seattle	102	0	552	73	339	497

Percent of units in each of four compromise-access categories

Compromised?	Walk Score	Six Cities	PubHsg	PBRA	LIHTC	HCV	Renters	Units
No	Inaccessible	Atlanta	56%	45%	48%	59%	58%	64%
No	Inaccessible	Boston	1%	11%	8%	11%	10%	13%
No	Inaccessible	Chicago	19%	16%	18%	20%	14%	19%
No	Inaccessible	Miami	20%	26%	10%	16%	22%	26%
No	Inaccessible	Phoenix	80%	83%	75%	91%	91%	93%
No	Inaccessible	Seattle	29%	18%	22%	45%	27%	37%
No	Accessible	Atlanta	22%	30%	17%	5%	23%	20%
No	Accessible	Boston	58%	58%	59%	41%	65%	64%
No	Accessible	Chicago	60%	55%	47%	30%	65%	61%
No	Accessible	Miami	43%	60%	50%	58%	63%	61%
No	Accessible	Phoenix	0%	15%	14%	4%	6%	4%
No	Accessible	Seattle	69%	82%	71%	51%	72%	63%
Yes	Inaccessible	Atlanta	19%	25%	31%	36%	18%	15%
Yes	Inaccessible	Boston	6%	3%	6%	12%	5%	5%
Yes	Inaccessible	Chicago	15%	20%	20%	29%	11%	12%
Yes	Inaccessible	Miami	31%	7%	19%	19%	9%	9%
Yes	Inaccessible	Phoenix	20%	2%	11%	5%	3%	3%
Yes	Inaccessible	Seattle	0%	0%	3%	2%	0.05%	0.03%
Yes	Accessible	Atlanta	3%	0%	4%	0%	1%	1%
Yes	Accessible	Boston	35%	28%	27%	37%	20%	18%
Yes	Accessible	Chicago	6%	9%	14%	21%	10%	9%
Yes	Accessible	Miami	6%	7%	21%	7%	6%	5%
Yes	Accessible	Phoenix	0%	0%	0%	0%	0%	0%
Yes	Accessible	Seattle	1%	0%	4%	1%	0.03%	0.02%

Colored cell	Significant difference percent HUD housing compared with percent all rental units at .05 level (uncolored = nonsignificant difference)
	Percent HUD housing lower than percent all rental units
	Percent HUD housing higher than percent all rental units

Compromised (6.4%)	African-American or Hispanic segregation ≥ 40% Nearest school within 0.5 miles is low performing Below median home values (MSA median)
Not compromised (93.6%)	African-American or Hispanic segregation < 40% Nearest school within 0.5 miles is not low-performing or no school is within 0.5 miles Above median home values (MSA median)

HCV = housing choice voucher. LIHTC = low-income housing tax credit. MSA = metropolitan statistical area. PBRA = project-based rental assistance. PubHsg = public housing.

Exhibit 6

Proportions of Units, by Accessibility, Compromised or Not, for Different Areas

HCV = housing choice voucher. LIHTC = low-income housing tax credit. MSA = metropolitan statistical area. PBRA = project-based rental assistance. PubHsg = public housing.

On the one hand, an above average proportion of project-based housing is in accessible, noncompromised, suburban areas. In all MSAs, walkable access that is not compromised is 4 percentage points more for public housing and PBRA units than for all rental units. This share contrasts with HCV and LIHTC units, which have 2 to 3 percentage points less than the average proportion of rental units in regards to noncompromised accessibility. Suburban neighborhoods drive this result for public housing and PBRA units. Compared with all rental units, noncompromised access is 2 percentage points less for public housing in urban areas but 6 percentage points more for public housing in suburban areas than for all rentals. For PBRA units, the respective results are 1 percentage point more in urban and 3 percentage points more in suburban areas. Project-based housing in walkable suburbs is one of the mechanisms that work to provide both accessibility and affordability.

For other neighborhoods with any HUD-assisted housing, walkable access is also compromised at above average proportions, especially in urban areas and for public housing. The proportion of HCV, LIHTC, and PBRA units with compromised walkable access is 2 to 3 percentage points more than for all rental units. It is even 9 percentage points more for public housing units than for all rental units. Most areas with compromised walkable access are in cities as opposed to suburbs.

The proportion of units in inaccessible neighborhoods with compromised neighborhood quality is greater for all four types of HUD-assisted housing than for all rental units; 4 to 5 percentage points more for HCV, LIHTC, and PBRA units and 8 percentage points more for public housing. These differences are also greater in cities than suburbs. Finally, the greatest differences between HUD-assisted and all rental units exist in regards to inaccessible neighborhoods without compromised neighborhood quality. These areas have 23 percentage points fewer public housing units than all rental units compared with 12 percentage points fewer PBRA units and 4 to 6 percentage points fewer LIHTC and HCV units. These differences are stronger for project-based units in cities and for HCV units in suburbs.

Of the 37 percent of all public housing units in accessible neighborhoods, neighborhood quality is compromised for 12 percent and not compromised for 24 percent (compared with 3 and 20 percent, respectively, for all rental units). By comparison, 30 percent of PBRA units are accessible—for 6 percent of these units access is compromised, but for 24 percent it is not. Hence PBRA units are comparable with public housing in terms of their proportion of noncompromised access but have a lesser proportion of compromised access (but still greater than that of all rental units). For HCV and LIHTC units, the rates of having noncompromised accessibility are below average (17 to 18 percent compared with 20 percent for all rentals) but the rates for compromised access are above average (5 compared with 3 percent for all rentals, although these rates are lower than for the other two project-based units). Nevertheless, of the 22 to 23 percent of HCV and LIHTC units in accessible neighborhoods, access is not compromised for 17 to 18 percent and is compromised for 5 percent. Note that the number of HCV units in accessible, noncompromised neighborhoods is actually more than that of public housing (360,456 compared with 235,076).

Regional variation exists within these national patterns. In the Midwest and Northeast, 65 percent of all rental units are in accessible, noncompromised areas. The proportions for HUD-assisted units are comparatively less but still sizable; 58 to 59 percent of all project-based units and 41 percent

of HCV units in the Northeast have uncompromised accessibility. By comparison, 60 percent of public housing, 47 to 55 percent of LIHTC and PBRA units, and 30 percent of HCV units are in accessible, noncompromised areas in the Midwest. The proportions of rental units in such areas are less in the South (44 percent) and West (32 percent), but above average proportions of project-based units (46 to 53 percent) are in these neighborhoods in the West. As compared with all rental units, accessibility is compromised more than average for LIHTC units in all regions and for public housing and HCV units in all regions except for the South.

A similar pattern holds at the city level; although often less than average as compared with all rental units, a sizable proportion of assisted units are in noncompromised accessible neighborhoods; for example, 47 to 60 percent for LIHTC, PBRA, and public housing units and 30 percent for HCV units in Chicago (compared with 65 percent all rental units). In Boston, 58 to 59 percent of all project-based assisted housing and 41 percent of HCV housing are in noncompromised accessible neighborhoods (compared with 65 percent of all rental units). In most of the six cities, however, above average proportions of LIHTC and HCV units especially are also in accessible areas with compromising factors.

Our quantitative comparison of Walk Score's accessibility metric with State of Place's index of walkability generally shows that areas with more HUD-assisted housing fare worse in terms of amenity quality, urban form, and safety (Koschinsky et al., 2014) than accessible areas without such housing. The State of Place index captures qualitative features of the walking environment, including the quality of amenities and safety, which are not captured by Walk Score. In other words, Walk Score, as a measure of walkable access to quality amenities, is more accurate in higher income neighborhoods than lower income ones. Walkable access means different things in these neighborhoods and is more likely to be compromised in lower income areas. These findings underscore the results of tradeoffs for HUD-assisted tenants between walkable access and compromising factors presented in this section. They support other research on tradeoffs (Neckerman et al., 2009) and related results discussed in the literature section.

Conclusion and Policy Implications

In this concluding section, we discuss some of the key implications of these findings for increasing the supply of walkable neighborhoods, changing program rules to improve walkable access, and measuring accessibility.

We discussed the growing demand for walkable neighborhoods throughout this report. Indeed, when residents with lower incomes are asked about their preference for living in walkable neighborhoods, their preference is as great if not more than that of residents in other income groups (Adkins, 2013; Nelson, 2013). As expected given increasing demand for walkable areas, however, their ability to realize this preference is less than that of higher income groups (Adkins, 2013) for the host of reasons that constrain choices of low-income tenants that we discussed in the review of existing studies. As a result, most residents do not choose their place to live based on perceived walkability (Fleury, 2013) but make housing choices based on information from their localized social networks and the availability of cheap rental housing (Skobba and Goetz, 2013). As in the case of Moving to Opportunity for Fair Housing demonstration program tenants (Briggs,

Popkin, and Goering, 2010), "moving to safety" is often a more immediate and realistic motivation than "moving to opportunity." In addition, as for the unsubsidized housing market, where about one-half of residents prefer to live in less walkable suburban settings (Nelson, 2013), walkability is likely more important for some but not all assisted tenants. For instance, for assisted tenants with mobility restrictions (who are elderly or disabled), walkability might be key whereas, for households with children, school quality might be more important, and if tradeoffs between walkability and school quality must be made, the latter might be a higher priority.

Besides these constraints, previous research empirically assessed the goal of using HCVs to enable tenants to move to higher opportunity neighborhoods and concluded that not enough rental units are available in these areas at given rent-subsidy levels (McClure, 2010). Neighborhoods with walkable access to high opportunities such as quality schools, employment, parks, and infrastructure are an even smaller subset of high-opportunity neighborhoods. Because only 14 percent of all MSAs are accessible, and given the recent increased demand for such neighborhoods from affluent residents, landlords in these areas have a comparative disincentive to rent to assisted tenants. In this context, planners and other stakeholders have been promoting changes in underwriting rules to accommodate more mixed-use development (such as the Federal Housing Administration's recently revised caps for commercial space in mixed-use condos), densification, complete streets, and other retrofitting approaches to increase the supply of accessible neighborhoods in urban and suburban areas.

One mechanism for enabling an expanded supply of walkable neighborhoods is a reform of zoning codes and land use regulations. Our analysis of accessibility and land use and zoning in the six cities (Atlanta, Boston, Chicago, Miami, Phoenix, and Seattle), found that more accessible areas are, not surprisingly, associated with greater land use diversity and with zoning that enables walking between different types of land uses (for example, multifamily and mixed use, flexible, walkable, and commercial) as opposed to zoning codes that isolate single-family uses from others (Talen, Koschinsky, and Lee, 2014). Cluster maps that group similar land use, zoning and urban form characteristics in neighborhoods with HUD-assisted housing for the six cities illustrate different ways in which cities do or do not mix land uses and achieve different levels of housing unit density. For instance, the strong mixing of pedestrian-friendly characteristics across neighborhoods in Boston make it one of the most walkable cities in the United States with the second greatest proportion of HUD-assisted housing in walkable urban areas in the country, preceded by only New York. By contrast, the spatial isolation of land uses, zoning, and urban form characteristics by neighborhood makes Atlanta one of the least walkable cities in the country with subsequent minimal proportions of HUD-assisted units in walkable areas. Land uses, zoning, and urban form characteristics in the city of Phoenix are also relatively mixed but not pedestrian friendly (as in the case of industrial uses). By comparison, Seattle, which is more accessible than Phoenix and Atlanta but less accessible than Chicago and Boston, consists of many residential neighborhoods that are, however, in close proximity to multifamily residential and commercial pockets along corridors and in so-called urban villages (densification related to urban growth concentration within city boundaries).

Given the current undersupply (and associated price premiums) of accessible neighborhoods even for higher income households, we see few alternatives to increasing the supply of these

neighborhoods as a prerequisite for locating more assisted housing or tenants in these areas. As the review of studies on affordable housing preservation near transit illustrated, however, efforts to increase walkable or transit access are soon reflected in land and home price premiums, which then tend to translate to increased rents, gentrification, and displacement. To avoid this result, targeted upzoning (densification) for only affordable housing can be an effective tool in tight housing markets. The goals of affordability and accessibility have to remain coupled when seeking to increase the supply of accessible neighborhoods for assisted tenants to avoid unintended consequences of displacement and loss of affordability (Chapple, 2009; Harrell, Brooks, and Nedwick, 2009; Haughey and Sherriff, 2010; Quigley, 2010). For instance, several state housing agencies have started to include transit access or higher walk scores as scoring criteria to fund LIHTC projects. Without other goals, such as desegregation or proximity to higher quality schools, these access criteria can run the risk of reconcentrating assisted housing in high-poverty neighborhoods, albeit walkable ones.

We argued that increasing the supply of neighborhoods with walkable access to amenities needs to be balanced with safeguards to preserve affordability and avoid displacement of low-income tenants. We contend that the emphasis on accessibility by foot similarly needs to be balanced with accessibility by other modes of transportation, including bikes, buses, and cars. Integrating walkable access with multimodal transportation approaches avoids locking tenants into being captive walkers when they would need other transportation options to, for example, access daycare, jobs, or health services that cannot be reached by walking. This need is especially great in lower density MSAs in the South and Southwest, where we have shown that only a minimal proportion of neighborhoods are walkable and where public transit service is often infrequent and with limited geographic coverage. Challenges with multimodal transport remain, however, including limited evidence that bike use is less frequent among assisted tenants (Moses, 2013). For instance, the Rockefeller Foundation also discontinued funding for a pilot bike program for public housing residents because too few tenants were considering it as a viable transportation option. On the other hand, access to cars has been found to be a key factor in securing and maintaining employment for assisted tenants (Pendall et al., 2014).

We found that measures of walkable access to amenities such as Walk Score's work better in higher income neighborhoods because they ignore problems in the quality of the walking environment, such as poor-quality amenities and urban form and lacking safety, that were more prevalent in lower income neighborhoods. The implication for measuring walkability, particularly in lower income neighborhoods, is that measures of accessibility need to be supplemented with socioeconomic indicators to capture potential tradeoffs that threaten to compromise the benefits of walkability.

These findings therefore suggest that the priority of walkable access needs to be weighted in the context of potential countervailing socioeconomic neighborhood characteristics. In terms of criteria for identifying sustainable neighborhoods, urban form characteristics (such as walkability) should be used in conjunction with socioeconomic indicators. Poverty likewise should not be used as a sole criterion, ignoring accessibility to relevant amenities such as jobs or daycare. From a conceptual standpoint, this criterion means integrating two notions of neighborhood. One notion prioritizes neighborhood as a social environment and one as a built environment. Each notion developed as relatively separate literatures in disciplines ranging from economics and sociology to

urban planning. We argue that this disconnect has problematic consequences for neighborhood research and practice, because built environment research often ignores social context and the potential differential meaning and importance of urban form in rich and poor neighborhoods.

In practice, the tensions between fair housing advocates—who aim for greater race and income equality—and sustainable communities proponents—who seek to improve sustainable urban form (Goetz, 2013)—illustrate the difficulties that arise when accessibility and socioeconomics are considered separately. On the one hand, the argument to develop and preserve more affordable housing near transit is consistent with the goal of promoting greater accessibility. Because accessible weak market areas likewise are also often more segregated (as we also demonstrated), more affordable housing in these areas might inadvertently lead to a confounding of concentrated and segregated poverty. Debates between proponents and skeptics of using the Center for Neighborhood Technology's Location Affordability Index for decisions related to HUD-assisted housing exhibit similar tensions between "driving to less segregated opportunity" and revitalizing accessible places with greater prevalence of poverty and segregation. Finally, prioritizing walkable access (for example, also in the case of extra points for LIHTC applications) without simultaneous regard for socioeconomic indicators, such as better school quality or market strength, could also create a higher risk of inadvertently supporting exclusionary zoning policies in suburbs (Schwartz, 2011).

Based on our results, we argue against the dichotomy between accessible, more segregated urban areas and inaccessible, less segregated suburban areas that often characterizes the fair housing versus sustainable communities policy debates. Instead, we see the more important distinction between noncompromised accessible as opposed to inaccessible areas, whether they are urban or suburban. We showed that, compared with all rental units in noncompromised accessible areas, a greater proportion of public housing and PBRA units is actually in denser suburban cores as opposed to urban parts of these areas. We did find evidence of less segregation in accessible suburban than in accessible urban areas. Rather than recommending that federal efforts be directed at low-density suburban locations rather than urban ones, however, we would recommend targeting accessible locations in both urban and suburban areas, especially those with less segregation, higher home values, and better schools. In this context, promoting project-based housing in walkable suburbs seems to be one of the strategies that work to achieve the joint goals of affordability and accessibility.

We find that accessibility is disproportionately compromised for all HUD-assisted tenants, but especially so for public housing tenants in urban areas. For a disproportionate number of other tenants in public housing and PBRA, however, accessibility is not compromised, especially in suburban areas. Given these different dynamics in accessible neighborhoods with HUD-assisted housing, we recommend different federal strategies for the areas that fall into one of the four categories of access and compromising factors (noncompromised or compromised accessible areas and noncompromised or compromised inaccessible areas).

1. Accessible neighborhoods with HUD-assisted housing and no compromising factors. Use these neighborhoods (in both urban and suburban areas) as best practices benchmarks, strengthen what works in these areas, and expand these practices to other areas. For instance, tie federal funding to the continued strengthening of local pedestrian- and transit-friendly zoning and land use and continue to support the development or preservation of affordable housing near transit.

2. Accessible neighborhoods with HUD-assisted housing and compromising factors. Target development and preservation resources in the subset of these urban and suburban neighborhoods that is near areas where accessibility is not or is less compromised. This targeted development could leverage the strength of these neighboring accessible areas and increase the income mix in accessible neighborhoods through a better integration of accessible neighborhoods with and without compromising factors.

3. Inaccessible neighborhoods with HUD-assisted housing and no compromising factors. These neighborhoods are where car ownership or sharing programs proposed by Pendall et al.'s (2014) research supposedly make most sense. We would not recommend, however, subsidizing project-based housing in these locations within a framework of sustainable communities because they are not accessible.

4. Inaccessible neighborhoods with HUD-assisted housing and compromising factors. Except for public housing, the greatest relative difference between HUD-assisted units and all rental units is actually in this category, which contains the worst of both worlds (inaccessible and compromised, which is reflected in lower land and home values). We recommend refocusing federal investments away from these areas toward more accessible neighborhoods.

Several extensions of our research could shed light on additional aspects of the relationship between walkable access and HUD-assisted housing. One would be to compare walkable access for different subgroups of tenants (such as tenants who are elderly, disabled, or with families) because walkability might matter more to residents with mobility restrictions, for example, seniors or children who cannot drive. A related question in this context is which subsidized tenant groups value access to amenities most and how they prioritize access given the tradeoffs with compromising factors that we identified in some neighborhoods. Furthermore, it would be very useful to be able to differentiate traditional public housing from HOPE VI in regards to accessibility, which we were unable to do because of data limitations. We found that public housing is disproportionately located in accessible neighborhoods as compared with other HUD programs and all rental units. One of the limitations is that we do not know whether this finding is driven by the newer decentralized HOPE VI developments, the older traditional public housing developments, or both. The difference is relevant because HOPE VI projects were often designed with walkable, mixed-income goals in mind and as alternatives to the isolated superblocks of traditional public housing. Finally, the lack of reliable neighborhood-level census data on low-income residents or low-income rental units has frustrated our efforts to compare HUD-assisted units in accessible neighborhoods with unsubsidized low-income rental units in accessible neighborhoods. This comparison would allow for us to more directly address the question of whether HUD-assisted housing is more likely—as opposed to all renters in our current comparison—to enable tenants to live in accessible neighborhoods (with and without compromising factors) as compared with unsubsidized low-income tenants. We are collaborating to address this question in the near future.

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