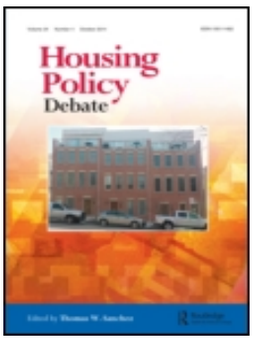

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Compact, Walkable, Diverse Neighborhoods: Assessing Effects on Residents

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What research supports the view that compact, walkable, diverse (CWD) neighborhoods are beneficial for urban residents? To make this assessment, we searched the literature to try to understand the current status of evidence regarding claims about the CWD neighborhood. We find that research linking CWD neighborhoods to effects on residents coalesces around three main topics: social relations, health, and safety. We conclude that on the basis of the literature reviewed, most of the intended benefits of the CWD neighborhood have been researched and found to have significant, positive effects for urban dwellers. While physical factors are but one element affecting behavior and outcomes, and the issues of self-selection and causality remain, overall, key dimensions of the CWD neighborhood have been found to positively affect social interaction, health, and safety.

Keywords: urban planning; smart growth; neighborhood; walkability; urban form

In the past decades, housing advocates have been paying more attention to the importance of neighborhood context, with federal housing policy now squarely focused on improving the neighborhoods of affordable-housing residents as one component of well-being. The goal of promoting housing in compact, walkable, diverse (CWD) neighborhoods is a dominant, defining characteristic of what that neighborhood context ought to be. It is a neighborhood type defined by services within walking distance of residents, a pedestrian orientation that minimizes car dependence, and a level of density and land-use diversity that is higher than the typical American suburb.[1] As such, it has much in common with the U.S. Department of Housing and Urban Development's (HUD) notion of "sustainable" communities (see, e.g., HUD, 2013).

CWD neighborhoods are not the norm. On the walkability dimension alone, the number of people now living in what could be considered a "walkable neighborhood" can be estimated using an accounting method developed by Walk Score (2013). Across 359 metropolitan areas in the United States, only 14% of neighborhoods are places where most errands can be accomplished on foot.[2]

This paper assesses the empirical evidence to date on what the effects of living in CWD neighborhoods are for the residents living in them. We focus on the well-being of individuals as opposed to broader environmental goals like the ability of the CWD neighborhood to reduce CO_2 emissions, land consumption, and heat island effects. This

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individual-level focus is appropriate for housing policymakers, who are generally not in the business of reducing greenhouse-gas emissions or suggesting public-transit investments but increasingly look beyond the quality and affordability of housing stock to include the associated neighborhood characteristics of where it is located. The recent rollout of the Location Affordability Portal (http://www.locationaffordability.info/lai.aspx), developed jointly by HUD and the U.S. Department of Transportation, attests to this interest.

While there have been several reviews of the literature on specific topics related to CWD neighborhoods (e.g., Ding & Gebel, 2012; Durand, Andalib, Dunton, Wolch, & Pentz, 2011; Saelens & Handy, 2008), our review is broader in that we assess multidisciplinary evidence on whether CWD neighborhoods improve the well-being of urban residents. To make this broad assessment, we searched the literature to try to understand the current status of evidence regarding claims about the CWD neighborhood. Focusing on the United States, we reviewed hundreds of articles, spanning topics as diverse as economics, biology, health, and architecture.[3] Our common denominator was research that attempted to link aspects of the CWD neighborhood as a physical phenomenon to resident-level effects. We reviewed approximately 225 articles, most of which are included in this review. Most of this research was published in the last decade or so, although we did not limit our review to any particular era. We focused on empirical and scholarly research, as opposed to practice-oriented writings, which may or may not be empirically based.

Table 1 provides a summary of the most relevant and most recent articles and research questions we synthesized. The selection, limited to the years 2002–2012, includes journal articles that we discuss under "social relations" and "safety," below, and the papers under "health" that had the most direct connection to the topic of assessing the effects of CWD neighborhoods—that is, studies that focus on the effects of the built environment on residents, where built environment (also termed *neighborhood context*) is defined by proximity of services, pedestrian orientation, density, or land-use diversity. We exclude review articles and include only articles in peer-reviewed publications. The purpose of the table is to provide an overview of the research questions reviewed and to provide a sense of the direction of association (positive, negative, or both/neither). Of the 95 examples included in the table, 62% were in health journals, 28% in planning/design, and 10% in transportation.

We find that research linking CWD neighborhoods to effects on residents coalesces around three main topics: social relations, health, and safety. The first covers the idea that CWD neighborhoods foster social interaction, sense of community, and feelings of identity; the second considers how CWD neighborhoods improve personal well-being in terms of health, largely through effects on travel behavior and walking; and the third concerns the impact of CWD neighborhoods on safety. Often these research questions were combined, as Table 1 shows. On the basis of the literature reviewed, we find that most of the intended benefits of the CWD neighborhood are supported—that is, they have been found to have significant, positive effects for urban dwellers, in terms of social interaction, health, and safety.

Two issues are excluded from this review. First, our review does not take on the important issue of implementation—that is, the degree to which CWD neighborhoods have been obtained and what factors might promote them, such as smart growth, urban growth boundaries, and code requirements. This remains an essential area of research; as some have observed, some key aspects of the CWD neighborhood, such as serviceability and access to public transportation, have been slow to materialize (Grant & Perrott, 2011; Tomer, Kneebone, Puentes, & Berube, 2011).

Table 1. Selected research that incorporates compact, walkable, diverse (CWD) neighborhood effects on residents, 2002–2012.

Study	Research question	Does the study support the view that CWD effects are *mostly* positive (+); *mostly* negative (−); or mostly both or mostly neither, depending on other factors (o)?			Is the focus on measurement issues?
		Social relations	Health	Safety	
Alfonzo et al. (2008)	What is the relationship between micro-scale, built-environment features of neighborhoods and walking among adults?		+	+	
Atkinson, Sallis, Saelens, Cain, & Black (2005)	What is the association of neighborhood design factors and recreational environments with physical activity?		+		
Badland, Schofield, & Garrett (2008)	Does the built environment affect transport-related physical activity behaviors in adults?		+		
Bejleri, Steiner, Fischman, & Schmucker (2010)	What is the role of barriers and facilitators to walking in children's travel to school?		+	+	
Bergman et al. (2009)	What is the association between health-enhancing physical activity and neighborhood environment among Swedish adults?		o		
Besser & Dannenberg (2005)	What is the total daily time spent walking to and from transit, and what are the predictors of achieving 30 minutes of daily physical activity?		+		
Boarnet, Greenwald, & McMillan (2008)	What is the magnitude of health benefits from urban design characteristics that are associated with increased walking?		+		
Brown, Khattak, & Rodriguez (2008)	Does neighborhood type affect residential health?		+		
Burton (2002)	What are the best indicators for measuring urban compactness?				Yes
Cao et al. (2006)	What role do neighborhood characteristics play once self-selection has been accounted for?		+		Partially
Cao, Mokhtarian, & Handy (2007)	Does neighborhood design independently influence travel behavior, or do preferences for travel options affect residential choice?		+		
Cao et al. (2009)	What is the relationship between the residential environment and nonwork travel frequencies by auto, transit, and walk/bicycle modes, controlling for residential self-selection?		+		

(*Continued*)

Table 1 – *continued*

Study	Research question	Does the study support the view that CWD effects are *mostly* positive (+); *mostly* negative (−); or mostly both or mostly neither, depending on other factors (o)?			Is the focus on measurement issues?
		Social relations	Health	Safety	
Cerin et al. (2007)	Does living in proximity to certain destinations increase walking for transport?		+		
Cerin, Leslie, & Owen (2009)	What are the perceived social and physical environmental mediators of the relations of individual- and area-level socioeconomic status with walking for transport?	+	+		
P. Clarke et al. (2008)	What are the effects of built-environment characteristics on mobility disability?		o		
Clifton, Livi Smith, & Rodriguez (2007)	How can we audit the pedestrian environment?				Yes
Cochrane et al. (2009)	What are the environmental and individual correlates of physical activity?		+	o	
Colquhoun (2004)	What is the relationship between urban design and crime?			+	
Cozens & Hillier (2008)	What is the relationship between street connectivity and crime?			o	
Cutts, Darby, Boone, & Brewis (2009)	What is the relationship among the distribution of populations vulnerable to obesity and proximity to parks and walkable street networks in Phoenix, Arizona?		o		
Day, Boarnet, Alfonzo, & Forsyth (2006)	What is an appropriate inventory of measures of the built environment?				Yes
De Bourdeaudhuij et al. (2003)	How is the variance in sitting, walking, and moderate and vigorous physical activity explained by neighborhood design and recreational-environmental variables?		+		
Donovan & Prestemon (2012)	Are street trees associated with lower crime rates?		+		
Doyle & Kelly-Schwartz (2006)	Are both walkability and safety required aspects of active community environments to promote health among residents?		+	+	
Dumbaugh & Rae (2009)	What is the relationship between community design and crash incidence?			+	

(*Continued*)

Table 1 – *continued*

Study	Research question	Does the study support the view that CWD effects are *mostly* positive (+); *mostly* negative (−); or mostly both or mostly neither, depending on other factors (o)?			Is the focus on measurement issues?
		Social relations	Health	Safety	
Dupere & Perkins (2007)	What is the relationship among community types, environmental stress, and mental health?		o		
Evenson et al. (2009)	How can we describe neighborhoods to explore associations with physical activity?				Yes
Ewing & Handy (2009)	How can we operationalize urban design qualities that are important for measuring walking?				Yes
Ewing et al. (2003)	What is the relationship between urban sprawl and physical activity, obesity, and morbidity?		+		
Forsyth et al. (2007)	Does residential density increase walking and other physical activity?		o		
Forsyth et al. (2008)	Do people walk more or less depending on the physical character of their residential areas rather than merely their individual characteristics?		+		
Forsyth et al. (2009)	The built environment, walking, and physical activity—is the environment more important to some people than others?		o		
Frank, Schmid, Sallis, Chapman, & Saelens (2005)	How are objectively measured levels of physical activity related to objectively measured aspects of the physical environment around participants' homes?		+		Partially
Frank et al. (2006)	What is the association between health outcomes and a single index of walkability that incorporates land use mix, street connectivity, net residential density, and retail floor area ratios?		+		Partially
Frank, Kerr, Sallis, Miles, & Chapman (2008)	How does the association of built environment with physical activity and body mass index differ by sociodemographic subgroups?		o		
Gallimore, Brown, & Werner (2011)	Do New Urbanist communities encourage walking to school?		+		
Gen & Pendola (2008)	Does "Main Street" promote a sense of community?	+			
Giles-Corti & Donovan (2002)	What are the individual, social, and physical environmental determinants of recreational physical activity?		+		

(*Continued*)

Table 1 – *continued*

Study	Research question	Does the study support the view that CWD effects are *mostly* positive (+); *mostly* negative (−); or mostly both or mostly neither, depending on other factors (o)?			Is the focus on measurement issues?
		Social relations	Health	Safety	
Handy et al. (2005)	What is the role of attitudes and preferences in explaining the observed link between the built environment and travel behavior?		+		
Handy et al. (2008)	What is the causal influence of neighborhood design on physical activity within the neighborhood?		+		
Hillier (2004)	Is there a correlation between crime and spatial design?			+	
Hoehner, Brennan Ramirez, Elliott, Handy, & Brownson (2005)	What is the relative association between perceived and objectively measured environmental factors with transportation or recreational physical activity?		+		
Hume et al. (2007)	What are the associations between children's perceptions of the neighborhood environment and walking and physical activity?		+		
Humpel, Marshall, Leslie, Bauman, & Owen (2004)	Do changes in perceived neighborhood environments affect walking?		+		
Humpel, Owen, Iverson, Leslie, & Bauman (2004)	What perceived environmental attributes encourage physical activity?		+		
Hutch et al. (2011)	What strategies potentially eliminate built-environment disparities for disadvantaged and vulnerable communities?		+		
Joseph (2008)	What are the satisfaction levels and social-interaction experiences of residents in mixed-income housing?	o			
Kerr, Frank, Sallis, & Chapman (2007)	Do correlations between walking and urban form relate to race, gender, and other household attributes?		o		
Kim (2007)	Does physical design foster a sense of community?	+			
Krizek & Johnson (2006)	Does having a bicycle lane or path close to home increase the likelihood of cycling, and does having neighborhood retail within walking distance increase the likelihood of walking?		+		

(*Continued*)

Table 1 – *continued*

Study	Research question	Does the study support the view that CWD effects are *mostly* positive (+); *mostly* negative (−); or mostly both or mostly neither, depending on other factors (o)?			Is the focus on measurement issues?
		Social relations	Health	Safety	
Landman (2009)	What is the relationship between urban form and crime prevention?			+	
Lee (2007)	What association does a neighborhood's physical and social environment have with transportation and recreation physical activities?		+		
Lee & Moudon (2006a)	What small subset of correlates can be isolated as strongly associated with walking, grouped as destinations, distance, density, and route?		+		Partially
Lee & Moudon (2006b)	What objectively measured and individually observable constructs best represent walkability?				Yes
Leslie et al. (2007)	How do built-environment factors influence participation in physical activity?		+		Partially
Leyden (2003)	Do pedestrian-oriented, mixed-use neighborhoods encourage enhanced levels of social interaction?	+			
Lindberg et al. (2010)	What is the evidence concerning the connection between health and housing interventions at the neighborhood level?		o		
Longley & Mesev (2000)	How can we measure and generalize urban form?				Yes
Lovasi et al. (2008)	Do built-environment characteristics near the home predict walking for exercise?		+		
Lund (2003)	Does New Urbanism impact neighboring behaviors?	+			
Marshall & Garrick (2010)	Does higher street network density improve road safety?			+	
Mason & Fredericksen (2011)	Does neotraditional design foster social interaction?	−			
McCormack, Giles-Corti, & Bulsara (2008)	What is the association between the proximity and mix of neighborhood destinations and physical activity?		+		
Minnery & Lim (2005)	Does environmental design reduce victimization and fear of crime?			o	

(*Continued*)

Table 1 – *continued*

Study	Research question	Does the study support the view that CWD effects are *mostly* positive (+); *mostly* negative (−); or mostly both or mostly neither, depending on other factors (o)?			Is the focus on measurement issues?
		Social relations	Health	Safety	
Mokhtarian & Handy (2008)	What are the environmental correlates of traveling out of the house with no particular destination in mind, controlling for attitudinal and sociodemographic factors?		+		
Moudon et al. (2007)	What attributes of the environment support walking?		+		
Neckerman et al. (2009)	How do neighborhood characteristics such as aesthetics and safety differ between poor and nonpoor neighborhoods that are equally walkable by conventional measures?		+		
Oakes et al. (2007)	Do density and street connectivity impact walking habits?		−		
Pikora et al. (2006)	What are the correlations between physical environmental factors and self-reported walking for recreation and transport near home?		+		
Podobnik (2011)	Are social and environmental objectives achieved in New Urbanist neighborhoods?	+	o		
Rodríguez, Khattak, & Evanson (2006)	Do New Urbanist communities encourage more physical activity patterns than do conventional suburban neighborhoods?		o		
Rodríguez et al. (2008)	What readily modifiable built-environment attributes are effective in influencing walking habits?		+		
Rogers et al. (2011)	Does walkability increase social capital?	+			
Roman & Chalfin (2008)	What is the relationship between crime and environmental disorder?			o	
Rutt & Coleman (2005)	What is the relationship among objectively measured built environment, physical activity, and body mass index?		−		
Saelens, Sallis, Black, & Chen (2003)	How can a neighborhood environment survey of physical activity and weight status be compared across neighborhoods?		+		Yes
Sallis et al. (2009)	How is living in high- vs. low-walkability and high- vs. low-income neighborhoods related to adults' biological, behavioral, social, and mental health outcomes?		+		

(*Continued*)

Table 1 – *continued*

Study	Research question	Does the study support the view that CWD effects are *mostly* positive (+); *mostly* negative (−); or mostly both or mostly neither, depending on other factors (o)?			Is the focus on measurement issues?
		Social relations	Health	Safety	
Sallis et al. (2011)	Do perceived neighborhood environmental attributes associated with physical activity differ by neighborhood income?		+	+	
Samuels (2005)	What is the relationship between "after-dark design" and interpersonal interaction?	+		+	
Santos et al. (2009)	What is the perception of the built environment in relation to physical activity in Portuguese adolescents?		+		
Schlossberg et al. (2006)	What is the relationship between urban form, distance, and active transportation to school among middle school students?		+		
Shay & Hall (2007)	What is the comparison between environmental measures of auto trips and neighborhood type?		+		
Shigematsu et al. (2009)	What is the association between perceived neighborhood environment and walking, across a wide adult age range?		+		
Singh et al. (2010)	What are the impacts of neighborhood socioeconomic conditions and built environments on obesity and overweight prevalence among U.S. children and adolescents?		+	+	
Spence, Nicoleta, Edwards, & Evans (2008)	What is the relationship between neighborhood design and body-weight status of preschool children?		o		
Spence et al. (2009)	What is the relationship between perceived neighborhood environment and sufficient walking to achieve health benefits among Canadian adults?		+		Partially
Stangl & Guinn (2011)	What is an appropriate measure of neighborhood design, connectivity assessment, and obstruction?				Yes
Talen & Koschinsky (2011)	Is subsidized housing in sustainable neighborhoods?				Yes
Timperio, Salmon, Telford, & Crawford (2005)	What is the association between parent and child perceptions of the local neighborhood and overweight/obesity among children?		o	o	

(*Continued*)

Table 1 – *continued*

Study	Research question	Does the study support the view that CWD effects are *mostly* positive (+); *mostly* negative (−); or mostly both or mostly neither, depending on other factors (o)?			Is the focus on measurement issues?
		Social relations	Health	Safety	
Wells & Yang (2008)	Do walking habits of women moving to neotraditional neighborhoods change when compared with women moving to suburban neighborhoods?		o		
Wen & Zhang (2009)	What is the effect of the built and social environment of urban neighborhoods on exercise?		+		
Wilkerson, Carlson, Yen, & Michael (2012)	Does the physical environment increase neighborliness?	+			
Wood et al. (2008)	What is a "safe and social" suburb, and what is the link among the built environment, social capital, and residents' perceptions of safety?	+		+	
Wood et al. (2010)	What is the relationship among walking, neighborhood design, and sense of community?	+			
Wridt (2010)	How can we map urban neighborhoods with children to promote physical activity and child-friendly community planning?				Yes

Second, we do not assess the broader negative social implications sometimes associated with CWD neighborhoods, most notably the correlation between CWD neighborhoods and gentrification (Pollack, Bluestone, & Billingham, 2010). This does not mean that we exclude research that fails to support the claims of CWD neighborhoods. On the contrary, we include research that tests the impacts of CWD neighborhoods on residents from a variety of perspectives. But such research on individual-level effects, and whether they can be supported, is distinct from research that focuses on the broader and sometimes negative social implications of the CWD neighborhood type.

While our review does not address implementation and equity issues, our intent is to go back to the evidence supporting first principles: What evidence is there that the CWD neighborhood as a specific neighborhood type is beneficial for urban residents? On what grounds should housing policymakers try to institute CWD neighborhoods, which they have come to believe have a positive impact on the well-being of urban residents? What does the research tell us about the effects of CWD neighborhood characteristics and the degree to which these qualities matter for urban residents?

Summarizing the literature on this question is important because, especially in the United States, the interest in linking CWD neighborhoods and housing has been embraced at the highest levels of government. The Obama Administration has been backing a place-conscious urban policy that prioritizes sustainable neighborhoods that are similarly defined (Turner & Berube, 2009). HUD's Office of Sustainable Housing and Communities promotes housing in the context of environmentally sustainable and socially inclusive development patterns, while the Choice Neighborhoods Initiative creates "viable, mixed income neighborhoods that have access to well-functioning services, high quality public schools and education programs, public assets, public transportation, and improved access to jobs" (HUD, 2014, p. D-2). Similarly, proposals such as the Promise Neighborhoods Initiative, as well as programs involving partnerships among the Office of Urban Affairs, HUD, and the Departments of Transportation and Energy, are aimed at creating neighborhoods that are essentially defined as compact, walkable, and diverse.

Defining the CWD Neighborhood

As the term indicates, CWD neighborhoods have three interrelated qualities, which in turn are believed to have positive effects on residents. They are compact, to promote social connection, enable public transit and other public services, and provide sufficient market catchment to support businesses within walkable distances. They are walkable, in the sense that they have plenty of nearby destinations and also employ certain forms known to enhance walkability, such as interconnected street networks and short blocks. They are diverse, both socially and in terms of land-use mix, both of which are enabled by mixing unit types as well as building ages. Other characteristics of CWD neighborhoods include the provision of central places where multiple activities can coalesce, the provision of well-located facilities that function as shared spaces, and human-sized buildings and green networks that promote pedestrian life (Campoli, 2012).

The CWD neighborhood is related although not identical to the notion of a sustainable neighborhood, which is often defined as one that exhibits specific physical qualities of urban form, especially good access to services, lower transport costs, a walkable and safe environment, and a built form that facilitates social and economic exchange (Daniels, 2009; Farr, 2008; P. Newman & Jennings, 2008).[4] It is not uncommon for the sustainable neighborhood to be defined in terms nearly identical to the CWD neighborhood (see, e.g., Speck, 2012; Talen, 2013).

These definitions are rooted in long-standing ideas about good urban form (see, in particular, A. Jacobs & Appleyard, 1987; J. Jacobs, 1961; Lynch, 1981). Convenient access to needed facilities, goods, and services is a key component of this, where the geography of opportunity has a significant bearing on the ability of low-income residents to improve their lives (Briggs, 2005). In fact, many researchers in the social sciences (e.g., Lindberg et al., 2010) use access as the primary measure of the physical design of neighborhoods. It is a measure that is especially important for locally oriented populations—residents who rely on modes of transport other than the automobile (e.g., the elderly and the poor; Wekerle, 1985).

In economic terms, CWD neighborhoods are believed to foster diverse economic networks of interconnected relations, a view that Jane Jacobs (1961) famously advocated in *The Death and Life of Great American Cities* and that Florida (2005), Glaeser (2011), and many others have expanded upon. The CWD neighborhood fosters exchange possibilities (A. Jacobs & Appleyard, 1987) and an integration of activities that are considered key to urban quality of life (see also Greenberg, 1995). A "richly differentiated neighborhood" is considered more "durable and resilient" against economic downturn and preferably exhibits a "close-grained" diversity of uses that provide "constant mutual support" (J. Jacobs, 1961, p. 14; see also Montgomery, 1998). CWD neighborhoods are also defined by social diversity, which has a number of important goals: to raise the living standards of lower-income residents; to encourage aesthetic diversity and cultural cross-fertilization; to increase equality of opportunity; and to maintain stable neighborhoods, whereby one can choose to move up or down in housing expenditure and remain in the same area (Sarkissian, 1976). The CWD neighborhood supports social diversity by providing a physical structure that mixes housing types and provides the public space and services that help support the mix (Talen, 2008).

Researching the CWD Neighborhood

Despite these claims and the widespread popularity of CWD neighborhoods, research on this neighborhood type as a separate, holistic phenomenon impacting the well-being of urban residents is generally confined to research on communities self-identified as New Urbanist or neotraditional. We go beyond this research to also include studies of individual aspects of the CWD neighborhood—for example, the effects of a pedestrian-oriented and interconnected street configuration, public-space provision, or density level. We thus include research that can be connected in some way to the main characteristics of the CWD neighborhood: its physical qualities of compactness, walkability, and diversity.

Because our focus is the CWD neighborhood as it relates to resident well-being, our summation of the literature is aimed at a smaller scale than the entire region. This distinguishes our review from much of the research on sustainable communities, which tends to be aimed at a metropolitan or regional scale. Often, the goal of that research is to assess the environmental, economic, and social effects of sprawl—an urban condition that, in contrast to the CWD neighborhood, is associated with negative environmental, economic, and social effects (Bengston, Fletcher, & Nelson, 2004; Burchell, Downs, McCann, & Mukherji, 2005; Freeman, 2001).[5]

Social Relations

The design of the neighborhood, it has been said, can contribute to "a physically humane setting for a social existence" (Gosling, 2003, p. 7). This might sound like common sense,

but what does the research say about the link between the CWD neighborhood and social relations, specifically social interaction and sense of community? We begin with the evidence on social interaction and then investigate the evidence on deeper affective dimensions like "community." The overview is limited to material that connects social relations to some aspect of the CWD neighborhood, thus omitting research on the social effects of sprawl or suburbia, on which there is a substantial literature. It is worth noting that many studies on the social aspects of sprawl reveal paradoxical effects in which there is both a loss of civic engagement and a heightened sense of personal fulfillment (e.g., Williamson, 2010).

That a CWD neighborhood affects social interaction seems an obvious point. Ruth Glass (1949) was an early observer, writing about the social effects of the postwar New Towns around London. She argued that the New Towns were not dense enough for social life, that physical distance was "interpreted as social distance—to some it appears to imply isolation and loneliness" (p. 51). In the decades following her call for more tests showing the influence of design on social relationships, researchers have attempted to isolate the exact nature of these effects. The Environmental Design Research Association was founded in 1968 to study such relationships, especially if they can be shown to address essential human needs like social connectivity (see, e.g., Vemuri, Grove, Wilson, & Burch, 2011).

One finding is that the relationship between density and interaction at the neighborhood level is not necessarily linear; studies have shown that density benefits reach certain thresholds or require certain design parameters. For example, Amick and Kviz (1975) found that social interaction was greatly improved in public housing where it consisted of low-rise buildings with high site coverage, as opposed to high-rise buildings with low site coverage. On the other hand, economic studies tend to show that the proximity associated with density facilitates information exchange (Carlino, Chatterjee, & Hunt, 2006; Glaeser, 2011). At a scale larger than the neighborhood, cities are conceived as "nodes for organizing the exchange of goods, services and information," their effect depending in part on urban spatial structure (Hall & Hesse, 2012, p. i).

At the neighborhood scale, a large number of studies have sought to determine the environmental factors associated with social interaction and affective feelings about the neighborhood. There is nothing particularly controversial about this assertion. That resident interaction is affected by spatial organization was advanced by Chicago School sociologists in the 1920s, who observed that contact is maintained by environmental characteristics and ecological explanations, including housing type, density, and land-use mix (Park, Burgess, & McKenzie, 1925). Before the Internet age, empirical research showed that neighborhood was an important factor in determining with whom residents interact (Greenbaum & Greenbaum, 1985) and that these patterns had something to do with the spatial boundaries of neighborhoods (Ahlbrandt & Cunningham, 1979; D. W. McMillan & Chavis, 1986). Even in the era of community without propinquity, social scientists continue to uncover the impact of place revealed through neighborhood effects (Sampson, 2012). The associations between physical characteristics of neighborhoods and levels of neighboring continue to attract scholarly interest, with one recent study finding higher levels of neighboring associated with front porches and sidewalks (Wilkerson, Carlson, Yen, & Michael, 2012).

Research on the determinants of social interaction can take place at the scale of individual sites (Greed, 2011). William Whyte and others observed that residents of "ambiguously oriented buildings" tend to be more socially disconnected (Hallman, 1959, p. 124), a finding in line with Gans's (1962) study of Boston's West End, which found that

structural features of buildings—window and door placement—were a factor in resident interaction. Similarly, Festinger, Schachter, and Back (1950), in an early study of friendship patterns in married-student housing, found that friendships were determined by the physical arrangement of houses and the access paths between them. Michelson (1970, 1977) was one of the early documenters of the effect of architectural design on promoting—or inhibiting—social interaction. He found that the spatial proximity of residents, based on the positioning of doors, determined interaction patterns. Yancey's (1976) study of the effect of the design of public housing (i.e., the Pruitt–Igoe project) on the formation of social relationships is also in this genre.

In line with the goals of the CWD neighborhood, interaction at the neighborhood scale has been shown to be a pedestrian phenomenon (Michelson, 1977), and networks of neighborly relations are related to interconnected pedestrian streets and the internal neighborhood access that those street networks engender (Grannis, 2005). The built environment can have an effect on constraining or promoting passive contact, and social interaction may ultimately be tied to the amount of passive contact that takes place (Fischer, 1982; Gehl, 1987), especially in CWD neighborhoods, where sidewalks are a prominent feature (Lund, 2003; Podobnik, 2011). The effect can work both ways: A study of mixed-income development in Chicago found evidence that physical design was a barrier to interaction in mixed-income housing developments (Joseph, 2008).

Comparisons between CWD neighborhoods and conventional neighborhoods often find that the former have higher rates of social interaction, a "substantially greater sense of community," and stronger place attachment (Kim & Kaplan, 2004, p. 313). Some researchers have shown an association between CWD neighborhoods and higher levels of trust and social engagement (Brown & Cropper, 2001; Leyden, 2003), although a study in the United Kingdom found no such association (Mason & Fredericksen, 2011). Researchers have utilized Robert Putnam's social capital scale (2007) to show the link between the CWD neighborhood and higher levels of social capital, measured by "networks, personal connections, and involvement" (Rogers, Halstead, Gardner, & Carlson, 2011, p. 201). Skjaeveland and Garling (1997) were able to show that both objective and perceived environmental variables were "powerful predictors" of neighboring (p. 192).

Also of interest is the design, arrangement, and adequacy of public space, a defining aspect of the CWD neighborhood. Fleming, Baum, and Singer (1985) found that common areas and other shared features had a strong impact on social contact. Researchers caution that the provision of public spaces for casual or spontaneous interaction does not necessarily create deep social bonds but instead promotes weak social ties, which are believed to be especially sensitive to environmental design (Skjaeveland & Garling, 1997). Public spaces that are specifically designed to increase resident encounters have been shown to have positive effects on social interaction, especially in mixed-income areas (Roberts, 2007). Users tend to utilize public space most often if they can walk to it—that is, if it is within 3–5 minutes' walking distance from their residence or workplace (Kaplan & Kaplan, 1989). Wilkerson et al. (2012) investigated the effect of a number of neighborhood qualities like sidewalks and traffic-calming devices on neighborliness and found a positive link—even when sociodemographics were controlled for—from greater utilization of public space and from greater use of local facilities for shopping (see also Levine, 1986; Riger, LeBailly, & Gordon, 1981). Based on these studies, strategies for encouraging the use of public open space have been proposed (Rishbeth, 2001).

Sometimes commercial streets take the role of public space in terms of providing a venue for resident interaction. The CWD neighborhood is defined as having high levels of local services and facilities, and the use of these facilities (for shopping, worship, or

recreation) has been linked to higher levels of resident interaction (Ahlbrandt, 1984). One study found that frequent destinations were helping create safe and social neighborhoods (Wood et al., 2008). Where a neighborhood is organized around a "Main Street," as opposed to neighborhoods without the seam of a commercial area, sense of community has been shown to be higher (Gen & Pendola, 2008). These seams have been shown to be especially important in socially mixed neighborhoods (Nyden, Maly, & Lukehart, 1997). Overly busy streets can have the opposite effect. Urban designers have long studied the social implications of busy streets and how street design can encourage or inhibit social interaction. Appleyard, Gerson, and Lintell (1981), for example, found that high-traffic streets have fewer social connections.

Because the CWD neighborhood is pedestrian-oriented, the importance of maximizing connectivity in urban space is a common theme, accomplished by increasing the number of routes (streets, sidewalks, and other thoroughfares and pathways) through an area. Some research has verified the effect, such as showing that the provision of alternative routes and access points affects both the public-space network and the corresponding patterns of movement (Salingaros, 1998). The pattern of streets can also have an impact on demographic sorting, counter to the goals of the CWD neighborhood. Grannis (1998, 2005) found that the internally connected patterns of pedestrian streets were strong correlates of racial and economic homogeneity.

Many researchers have attempted to move beyond social interaction and find a link between walkable urban form and sense of community. Initially, attempts to link sense of community with neotraditional or New Urbanist design came up short (Nasar, 2003). More detailed assessments, in which the individual components of urban form are analyzed separately, yielded greater support. A study of Kentlands, Maryland, for example, showed that housing type, site design, and 10 unique features relating to amenities and public space provision impacted sense of community (Kim, 2007). Wood, Frank, and Giles-Corti (2010) surveyed residents in Atlanta, Georgia, to find a positive association between sense of community and walkable street design, using the ratio of commercial floor space to land area as a proxy. The fact that mixed use had a negative association with sense of community while the proxy (walkable street design) did not was attributed to urban design quality because the latter measure captured the presence of "convivial pedestrian-friendly commercial areas … rather than flat surface parking" (p. 1381).

On the issue of building community, there is a sense that we have expected too much from the physical environment (Brooks, 1974; Tennenbaum, 1990), and in any case, some see the attempt to build community as counter to the "natural" tendency of American social life (Audirac, Shermyen, & Smith, 1992; Berry, 1976). Others have stressed that physical design need not create sense of community, but rather, it can increase its probability (i.e., environmental probabilism; see Bell, Fisher, Baum, & Greene, 1990). This avoids, to some extent, the problem of physical determinism and the "social repression" (Harvey, 1997, p. 69) that some believe is linked to attempts to build community as opposed to merely trying to increase social contact (see also Silver, 1985), as well as the failure to show a stronger sense of community in higher-density mixed-use development as opposed to conventional suburban development (e.g., Nasar, 2003).

To the extent that the CWD neighborhood is intended to be both socially diverse and socially integrative, there is evidence that these goals are in conflict. In particular, the effort to deconcentrate poverty through mixed-income housing development has generated a large literature assessing the effects of mixed-income (i.e., diverse) neighborhoods on low-income residents. Although *neighborhood* in this context is defined by poverty level (and other social variables) as opposed to physical urban form, one

relevant aspect is that surveys of affordable-housing residents moving to mixed-income neighborhoods (the "diversity" part of the CWD neighborhood) have revealed weak social ties and a higher sense of vulnerability (Clampet-Lundquist, 2010). This was a social dynamic associated with mixed-income neighborhoods that sociologist Glass (1949) had worried about earlier in relation to British New Towns. The argument is still being made that low-income residents in mixed-income neighborhoods may be subjected to new forms of exclusion and the blocking of integrationist goals via institutionalized stigma (Chaskin, 2013).

Beyond social relations like interaction and community, certain features associated with the CWD neighborhood have been shown to positively impact a range of perceptions and personal feelings. For example, neighborhood design that includes green spaces has been shown to impact how residents assess their quality of life (Kuo, Bacaicoa, & Sullivan, 1998), a finding in support of Wilson's (1984) biophilia thesis that humans have a need to connect with nature. There is a certain degree of ambiguity when relating these findings to the CWD neighborhood, however, because the CWD neighborhood tends to emphasize walkability over green space, unless the latter is integrated in a way that does not disrupt social connectivity. Thus, although a recent longitudinal study (Berry & Okulicz-Kozaryn, 2011) revealed a gradient from low levels of happiness in the central city to high levels in the small town/rural periphery, without knowing the details of urban form involved, it is unclear to what degree these findings reflect negatively on the CWD neighborhood.

Meaning is enhanced through well-designed public spaces, irrespective of their level of green (Carr, Francis, & Rivlin, 1992; see also Franck & Paxson, 1989). A deteriorated neighborhood that lacks memorable places can exert negative social effects, such as alienation (Brown, Perkins, & Brown, 2003). Sociologists have documented that the simple act of naming memorable places—such as a rail transit line and station—improves neighborhood identity (Douglas, 2010). The act of naming and caring for the particulars of neighborhood design becomes part of an "awareness-raising process" (Forsyth, Nicholls, & Raye, 2010, p. 270) that can foster a proprietary attitude (Hale, 1996) toward the neighborhood. In his study of social cohesion in a Chicago, Illinois, neighborhood, Suttles (1968) maintained that it is the sense of turf—the bounded neighborhood itself that residents identify with—that creates social cohesion. To the extent that the CWD neighborhood offers an urban form that is identifiable, it is possible to attribute positive effects.

Health

The above literature summarizing the social effects of the CWD neighborhood is relatively small in comparison to the amount of research that has been directed at linking the CWD neighborhood to health. These health effects are predominantly a function of travel behavior. In general, research shows that the CWD neighborhood is more likely to result in lower car use (Ewing, Bartholomew, Winkelman, Walters, & Chen, 2008; Holtzclaw, Clear, Dittmar, Goldstein, & Haas, 2002) and support the needs of pedestrians and bicyclists over car drivers (Moudon & Lee, 2003). It is important to caution, however, that positive effects of the built environment on health outcomes are likely to be limited by intervening factors such as poverty, crime, and segregation (Lovasi, Neckerman, Quinn, Weiss, & Rundle, 2009).

Research on this topic has been thorough. A recent meta-analysis (Ewing & Cervero, 2010; see also Brownson, Hoehner, Day, Forsyth, & Sallis, 2009; Saelens & Handy, 2008)

of the effect of the built environment on travel concluded that destinations and street network design consistently reduced vehicle miles traveled. Walking was impacted by land-use diversity, destinations, and intersection design. Density and land-use mix are correlated with lower car use, higher transit use, and more walking for both work and shopping trips (Frank & Pivo, 1994). Land-use mix is often a significant explanatory variable in the study of what motivates walking behavior (see, e.g., Rajamani, Bhat, Handy, Knaap, & Song, 2004), and conversely, places that are low-density and single-use, with disconnected street networks, increase auto dependence and decrease transit use and walking (Frank et al., 2006). P. W. G. Newman and Kenworthy (2006) quantified the threshold: Below 86 persons per acre (35 residents per hectare), "the physical constraints of distance and time enforce car use as the norm" (p. 35).

Studies have homed in on specific design features that encourage walking—a key feature of the CWD neighborhood. Specific characteristics of pedestrian-oriented streets, including a well-maintained walking surface (Pikora et al., 2006), and aspects of the built environment that are "modifiable in the short term," such as access to transit, sidewalks, and car-parking availability (Rodríguez, Aytur, Forsyth, Oakes, & Clifton, 2008, p. 260), have been shown to impact the degree to which people are willing to walk (Forsyth, Hearst, Oakes, & Schmitz, 2008). Distinctions have been drawn between places that support walkability and places that support urban liveliness (Zook, Lu, Glanz, & Zimring, 2012). Other studies look at specific populations, such as the ability of urban form to influence children walking to school (T. E. McMillan, 2005), generally finding that characteristics of urban form such as intersection density (positively associated) and number of dead-end streets (negatively associated) predict travel mode (Schlossberg, Greene, Phillips, Johnson, & Parker, 2006).

The impact of the CWD neighborhood on pedestrian behavior has been further refined in numerous ways. For example, studies have investigated the effects of particular types of destinations, or the impact on walking at particular distances. One study found that one mix of destinations (including bus stops and convenience stores) was associated with walking within 400 meters of a respondent's home, while another mix of destinations (including schools and convenience stores) was associated with walking within 1,500 meters (McCormack et al., 2008). Another study found that characteristics of local shopping streets such as low traffic volume and an integrated street network were important predictors of walking for utilitarian trips, but not as much for nonutilitarian walking (Cao, Handy, & Mokhtarian, 2006). In one study, walking was found to be associated with utilitarian destinations, but recreational walking was associated only with sidewalks (Lee & Moudon, 2006b).

Studies of the effect of the CWD neighborhood on how people travel tend to debate the strength of this association—how important compactness and diversity of land use are in reducing car trips, not *whether* they are important (Boarnet & Crane, 2001; Frey, 1999; Jenks, Burton, & Williams, 1996; Williams, 2005). An important study by Handy, Cao, and Mokhtarian (2005) found support for causality; that is, if the built environment brings residents closer to destinations, residents drive less. The importance of proximity has been of special interest, although the relationships might be nonlinear, or only evident at close distances (Krizek & Johnson, 2006). Moudon et al.'s (2007) investigation of the environmental attributes of walking concluded that distance to neighborhood destinations "dominated the results" (p. 448).

These travel outcomes are valued not only because they improve mobility choice (i.e., residents have the freedom to travel on foot or without a car) but also because of positive health effects. There is now a vast literature linking the CWD neighborhood to health

outcomes via physical activity, especially walking. Ewing, Schmid, Killingsworth, Zlot, and Raudenbush (2003) showed that people who live in sprawl—that is, non-CWD neighborhoods—tend to walk less and weigh more, although Durand, Andalib, Dunton, Wolch, and Pentz's (2011) review of the literature linking smart growth (e.g., land-use diversity, mixed housing types, compactness) to health was strong in terms of effect on physical activity (walking) but not in terms of body mass. However, walking (irrespective of the built environment) has been shown to lower obesity, improve mental health (Kloos & Shah, 2009), and, one study found, increase brain function (Erickson et al., 2010). People with certain chronic illnesses (e.g., diabetes, high blood pressure) have been shown to have better health if they live in places with high street connectivity (Kelly-Schwartz, 2004), which is a characteristic of the CWD neighborhood. Transit use, also associated with the CWD neighborhood, has been related to weight loss (Rundle et al., 2007), even when controlling for selection bias (MacDonald, Stokes, Cohen, Kofner, & Ridgeway, 2010). One survey concluded that long commute times are associated with a range of adverse physical and emotional conditions (Crabtree, 2010).

Although these effects have been disputed on the grounds that self-selection is not sufficiently controlled (Eid, Overman, Puga, & Turner, 2008), researchers have worked to try to separate environmental correlates from individual and socioeconomic ones (Cochrane et al., 2009). Sophisticated models have been used to control for self-selection bias; Ewing and Cervero (2010) reported 38 studies using nine approaches in the attempt to control for self-selection, with most studies finding that the built environment retains a strong influence (Cao, Mokhtarian, & Handy, 2009). Some have found that "socially similar people do the same total amount of physical activity in different kinds of places" (Forsyth et al., 2008, p. 1973), although some people (unemployed or retired) appear to be more sensitive to environmental characteristics (Forsyth, Oakes, Lee, & Schmitz, 2009). There continue to be calls for more "moderators and mediators" and better research designs that could address causality (Ding & Gebel, 2012, p. 100). But overall, the vast majority of studies show that built-environment effects are generally in one direction: People living in CWD neighborhoods, especially places defined by accessibility and gridded street networks, tend to have higher health ratings, with an important caveat being that these relationships may not hold where there is significantly high crime and high poverty (DeGuzman, Merwin, & Bourguignon, 2013). Most, although not all, meta-analyses summarizing these relationships have concluded that there are strong correlations overall (Ding & Gebel, 2012), and, in particular, "accessibility, opportunities, and aesthetic attributes" show strong association with physical activity (Humpel, Owen, & Leslie, 2002, p. 188).

How these effects vary by subgroup (or by country; cf. Bergman et al., 2009; De Bourdeaudhuij, Sallis, & Saelens, 2003; Santos, Page, Cooper, Ribeiro, & Mota, 2009) has been a significant concern. Although a clear linkage was found between neighborhood walkability and physical activity for Belgian adults, this linkage did not hold for a study involving Belgian adolescents (Van Dyck, Cardon, Deforche, & De Bourdeaudhuij, 2009). Researchers have found that sidewalk quality significantly impacts the mobility of disabled populations (P. Clarke, Ailshire, Bader, Morenoff, & House, 2008), that the association between destinations and walking is stronger among boys (Hume, Salmon, & Ball, 2007), that high density has a stronger affect on walking for people who are less healthy or unemployed (Forsyth et al., 2009), and that the pedestrian-friendliness of neighborhoods has a strong impact on the walking habits of residents of multifamily housing (Larco, Steiner, Stockard, & West, 2012). For women, proximity to workplace has

been found to be a strong predictor of transport-related walking (Cerin, Leslie, du Toit, Owen, & Frank, 2007).

There is less agreement when the focus is on a dimension of the CWD neighborhood that is more variable in terms of measurement. For example, a review of the evidence linking green space and obesity concluded that findings were "inconsistent and mixed across studies" (Lachowycz & Jones, 2011, p. e183). Similarly, density, which can be variously defined, provided only mixed results in one study attempting to link it to walking and physical activity (Forsyth, Oakes, Schmitz, & Hearst, 2007). The connection between active transport (which may or may not be related to the built environment) and physical activity and lower body weight is inconclusive (Wanner, Götschi, Martin-Diener, Kahlmeier, & Martin, 2012). A study of a Hispanic community found higher levels of body mass index in places with a higher land-use mix (Rutt & Coleman, 2005), while a review of the literature on built environment and children concluded that due to conceptual gaps and measurement problems, findings were inconsistent. Associations differed by "gender, age, socioeconomic status, population density and whether reports were made by the parent or child" (Dunton, Kaplan, Wolch, Jerrett, & Reynolds, 2009, p. 393). A study of the impact of community design and recreational access found "limited evidence" of increased physical activity in adolescents (Norman et al., 2006, p. S118). One recent study involving members of an HMO found no association between the built environment and walking for exercise (Lovasi et al., 2008).

Measurement is a significant factor in this variation. Built-environment and health linkages depend to some extent on what is measured and how, and epidemiologic evidence has been constrained by inconsistent measurement of both environmental characteristics and activity levels. One study found that "the effects of density and block size on total walking and physical activity are modest to non-existent, if not contrapositive to hypotheses" and argued that this was attributable to sampling design (Oakes, Forsyth, & Schmitz, 2007, p. EP + 1). Another issue is the difference between studies that incorporate administratively defined neighborhoods versus individually unique geographic buffers, which may lead to inconsistencies. One systematic review of 63 papers linking built environment and obesity found that there was "very little between-study similarity in methods," thus limiting the ability to consolidate a "body of evidence" (Feng, Glass, Curriero, Stewart, & Schwartz, 2010, p. 175). Others have reviewed the "inconsistent findings" concerning built-environment effects and attributed them to "measurement limitations" (Foster & Giles-Corti, 2008, p. 241). In particular, there are problems with the self-reporting of physical activity, including duration, intensity, and preferences (Handy, Sallis, Weber, Maibach, & Hollander, 2008).

Safety

The CWD neighborhood is considered safe in that (1) it does not prioritize unimpeded vehicular flow and therefore makes thoroughfares safer for both drivers and pedestrians, and (2) its promotion of compact urban form and the resultant activation of street life provide a buffer against crime. It should be noted that in the literature linking built environment and crime, the definition of *built environment* often lies outside the scope of the CWD neighborhood, including factors such as closed-circuit TV systems, lighting, or housing-renovation initiatives (e.g., Lorenc et al., 2013).

In general terms, neighborhood context plays a role in affecting safety either by contributing to feelings of security in neighborhoods or through crime-prevention strategies (Loukaitou-Sideris, 2006). Following on the "broken windows" hypothesis of

Kelling and Wilson (1982), there is evidence that physical deterioration—incivilities like litter and graffiti—reinforces social disorder and heightens fear of crime (Lewis & Maxfield, 1980), a phenomenon now extending to the suburbs (Wood et al., 2008). Relatedly, researchers found a positive association between the presence of street trees (which are associated with CWD neighborhoods) and crime reduction, postulating that trees give the impression that a property is well cared for (Donovan & Prestemon, 2012).

The issue of safety is interconnected with the social and behavioral topics discussed above. For example, safety continues to emerge as one of the most important variables impacting walking (Alfonzo, Boarnet, Day, Mcmillan, & Anderson, 2008), although researchers have cautioned that in assessing built environment and active living, fear of walking outdoors has not been fully integrated into research designs (Roman & Chalfin, 2008). Another caution is that although safety is a mediating factor in the link between built environment and physical activity, studies tend to be cross-sectional and causality cannot be assigned (Carver, Timperio, & Crawford, 2008). On the social dimension, an increase in feelings of safety in the CWD neighborhood has long been believed to have a positive effect on neighboring (O. Newman, 1972). Social diversity, defined by mixed income (whether compact and walkable or not), has been shown to increase feelings of safety among low-income residents who were previously living in concentrated poverty (Briggs, Popkin, & Goering, 2010).

The linkage between neighborhood design and safety draws from the writings of Jane Jacobs. The basic idea is that active streets with lots of pedestrians encourage natural surveillance because residents are more inclined to look out the window. Jacobs (1961) introduced the notion of "eyes on the street," public–private space delineation (supporting unambiguous functionality; see Colquhoun, 2004), and active streets as public-safety strategies. Security is also increased by activating dead space—unclaimed land of which ownership is ambiguous. She was drawing on evidence that housing that was walled off and abruptly insular, like public housing on superblocks, was unsafe because it did not allow a direct opening or connection to the surrounding neighborhood. *Natural surveillance* means that people can keep an eye on neighborhood activities as part of their everyday routines, supported by a built environment where public spaces are fronted with housing rather than empty lots.

Researchers have produced empirical verification of Jacobs's basic ideas. CPTED (crime prevention through environmental design; Jeffrey, 1971) evolved out of Jacobs's ideas and became the standard set of mechanisms for reducing crime, as well as fear of crime, using the built environment to manipulate behavior (in addition to management, programmatic, and other policies). Gehl (2010) showed that vandals are discouraged where buildings provide the possibility of surveillance through windows. He also documented how ground-floor architecture—involving standards for display windows, building entrances, story divisions, materials, and signage—was important for urban security. Mixing uses is also believed to contribute to natural surveillance. A recent study in Los Angeles, California, showed that mixing residential and commercial uses, a key component of the CWD neighborhood, was associated with a reduction in crime (Anderson, Macdonald, Bluthenthal, & Ashwood, 2013). Less confirming was a study that showed that businesses and parks in residential areas, at least, did not increase fear of crime if crime rates were controlled for (Wilcox, Quisenberry, & Jones, 2013).

For housing, the evidence that attached housing is more secure than detached housing is "pretty unambiguous," where "the fewer sides on which your dwelling is exposed to the public realm the safer you are likely to be" (Hillier, 2004, p. 44). It should be noted that

these relationships and behaviors are conditioned by social makeup (Foster & Giles-Corti, 2008), which is true of every other example of built-environment effects on safety.

There has been an ongoing debate about the strength of the linkage between the built environment and safety. Aurbach (2007) reviewed the various critiques of CPTED strategies, which some have viewed as too much of a one-size-fits-all approach that fails to adequately take into account social factors (R. V. Clarke, 1992; Cozens & Hillier, 2008; Landman, 2009; Saville & Cleveland, 1998). One study in Australia reported that CPTED measures were effective for reducing feelings of victimization but not the fear of crime (Minnery & Lim, 2005). Later approaches, including Alice Coleman's Variable Design strategies and Bill Hillier's Space Syntax Theory pattern language, (Cozens & Hillier, 2008), called for more context-sensitive changes in urban form to maximize connectivity, territoriality, and natural surveillance. St. Jean (2007) showed how differences in the spatial positioning of block-by-block factors could play a significant role in explaining patterns of neighborhood crime.

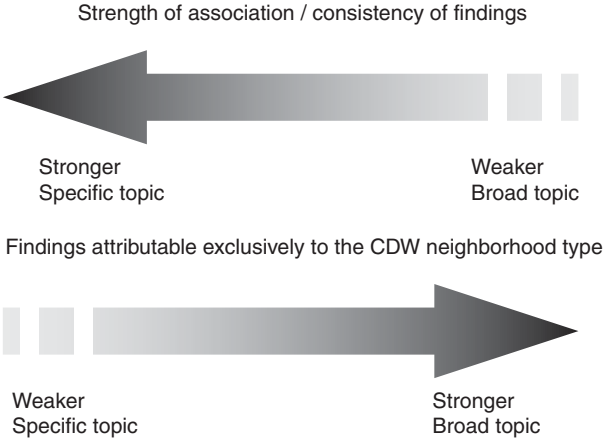
A basic, unresolved tension in all of this research is that, on the one hand, there is safety in numbers, and urban form can play a role in activating public space, but on the other hand, restricted access can sometimes make places safer. The debate has been described as integrated versus segregated approaches to crime prevention, the former being more aligned with CWD neighborhoods. Thus, in contrast to Jacobs's ideas about creating a more connected public realm, O. Newman's (1972) "defensible space" principles included restricting access at certain points, that is, closing off selected streets to limit vehicular through traffic, which a U.S. Department of Justice publication later reviewed and supported (R. V. Clarke, 2006). Where the segregationist approach is taken to extreme, "target-hardening and territorialization" result in gated enclaves that benefit only limited, affluent populations (Landman, 2009, p. 225).

Finally, there is the link between the CWD neighborhood and traffic safety. There has been some change in this assessment in the past few years. Whereas safety used to be thought of as a matter of allowing unimpeded vehicular flow, limiting the amount of access that pedestrians have, it is now known that this metric fails to consider the safety effects on pedestrians. A survey of 24 California cities showed that severe crashes occurred most in places with low street network density, while safety outcomes were better in places with high intersection density, which is associated with the CWD neighborhood (Marshall & Garrick, 2010). Street design—for example, whether street trees are present, or the width of the road—has been shown to have a psychological effect on travel behavior: People slow down on account of the street's "body language" (Massengale & Dover, 2013; see also Dumbaugh & Rae, 2009). Cul-de-sacs, once considered safe by virtue of being dead ends, are being given a new assessment based on a broader view of safety. For example, cul-de-sacs can give a false sense of security, which in turn means that "parents don't teach their kids about street safety and the 'difference between street and sidewalk and driveway and yard'" (Snyder, 2011, p. 1; see also Lucy, 2003).

Conclusion

This article has summarized the literature assessing whether CWD neighborhoods, defined as physical places that are compact, walkable, and diverse, are good for individual well-being. On the basis of the literature reviewed, we find that the literature coalesces around social, health, and safety effects and that most of the intended benefits of the CWD neighborhood are supported—that is, they have been found to have

Figure 1. Compact, diverse, walkable (CDW) neighborhoods and effects on residents: Two general trends.



significant, positive effects for urban dwellers. Thus, on the whole, CWD urban neighborhoods have been found to positively affect social relations, health, and safety.

Figure 1 provides a conceptual diagram of two trends that can be discerned by thinking broadly about the hundreds of articles cited here. First, the strength of the association between CWD neighborhoods and positive effects tends to be stronger and more consistent the more specific and measurable the topic. Thus, for example, social interaction, walking, and traffic safety have a stronger and more consistent relationship than do the broader and more complex dimensions of community, obesity, and crime reduction. A second, potentially countervailing trend is that the more specific the dimension under study, the less exclusive it is to the CWD neighborhood as a type. Thus, for example, green space and density, or even front porches and sidewalks, although potentially affirming of CWD neighborhoods, might also be connected to other neighborhood forms. However, when multiple dimensions are analyzed together as a more complete package—for example, by looking at New Urbanist neighborhoods—it is easier to attribute findings (whether positive or negative) to the CWD neighborhood type.

As with any attempt to link an elusive goal like individual well-being to a physical construct like the CWD neighborhood, there are limitations and complexities to be considered. Significant limitations are that physical factors are but one element affecting behavior and outcomes, that there are many indirect effects, and that it is difficult to assign causality. In addition, the need to separate out and analyze the effect of individual aspects of the CWD neighborhood—street design, public space, and the like—is not an ideal approach and, as conceptualized in Figure 1, is less attributable to the CWD neighborhood. Composite measures of neighborhood environment are also important because individual features add up to more than the sum of their parts (Alfonzo et al., 2008). A further complication, as some have observed, is that neighborhoods might be beneficial on some dimensions, such as in terms of walkability, but deficient in other ways, such as employment access, crime, or school quality (Been et al., 2010; Pendall & Parilla, 2011).

Housing policymakers need an informed understanding of what the CWD neighborhood can be expected to achieve. The modification of physical urban form holds significant potential for addressing housing-related quality-of-life issues, but there is

also a need for significant caution about giving physical urban form too much import. Critics worry about physical determinism and object to the tendency to propose brick-and-mortar solutions to complex problems that cannot be addressed through physical design. This remains a valid concern.

Yet, it sometimes seems that the potential for CWD neighborhood form to address urban quality-of-life issues is underplayed. In the United States especially, many social critics are reluctant to use urban form as an appropriate focus of policy intervention (see Hall, 2002). Some researchers have noted that there remains a disconnect between neighborhoods viewed in purely social terms and neighborhoods viewed as physical settings (Roman & Chalfin, 2008; Singh, Siahpush, & Kogan, 2010; Wen & Zhang, 2009). Social scientists often focus on the strong links that can be made between social and spatial isolation (Massey & Denton, 1993), emphasizing the neighborhood as the context of social problems, from high unemployment (Granovetter, 1990) to crime (Sampson, Raudenbush, & Earls, 1997), but the connection to CWD neighborhood form is not exploited as a potential way to address these problems.

The appeal of leveraging built form—the CWD neighborhood—to achieve desired effects is linked to its tangibility. The provision of proper access to facilities, of high-quality public spaces, of social and economic diversity, and of humanly scaled neighborhoods that promote walking are goals that stand on their own. The challenge is to fully exploit the transformative power of what the CWD neighborhood can do, without overstepping the bounds and expecting more than can be delivered. A broadly cast and regularly updated assessment of research outcomes is essential to this purpose.

Notes

1. CWD neighborhoods can, and do, vary in terms of specific design features like block size, street type, building forms, and mix of amenities. Our focus is on the general parameters of the CWD neighborhood as a type distinct from auto-dependent, single-use suburbs.
2. This statistic is based on a Walk Score of 70 or higher, obtained at the block group level for 359 metro areas. Information on Walk Score's algorithm and rating system can be found at http://www.walkscore.com/.
3. The following journals were included: Planning/Design—*Journal of Urban Design*, *Journal of the American Planning Association*, *Urban Studies*, *Environment and Planning*, *Journal of Planning Education and Research*, *Urban Design International*, *Environment and Planning A and B*; Health—*American Journal of Preventive Medicine*, *Journal of Physical Activity and Health*, *Health and Place*, *International Journal of Environmental Research and Public Health*, *American Journal of Health Promotion*, *American Journal of Community Psychology*, *American Journal of Public Health*, *British Journal of Sports Medicine*, *Environmental Psychology*, *Annals of Behavioral Medicine*, *International Journal of Health Geographics*, *Preventive Medicine*, *Environment and Behavior*, *Epidemiologic Perspectives & Innovations*, *International Journal of Pediatric Obesity*, *Health Affairs*, *International Journal of Obesity*, *Medicine and Science in Sports and Exercise*, *Canadian Journal of Public Health*, *Social Science & Medicine, International Journal of Behavioral Nutrition and Physical Activity*; Transportation—*Transportation Research Part A*, *Transportation Research Part D*, *Transportation*, *Transportation Research Record*.
4. The many environmental impacts of the sustainable neighborhood—which overlaps substantially with the CWD neighborhood—can be summarized. The sustainable neighborhood has the ability to (1) lower vehicle miles traveled, limiting carbon emissions by looking for ways to reduce reliance on fossil fuels (cars) and increasing reliance on clean transportation (e.g., bus rapid transit, light rail); (2) lower energy costs by lowering infrastructure, like highways, and utility lines, which in turn results in lower transmission loss; and (3) limit damage to natural

environments by lowering impervious surfaces and runoff, compacting development, and lowering disruption of biodiversity and natural habitat (Ewing et al., 2008).

5. See, for example, the research connecting sprawl to global warming (Gonzalez, 2009), social inequity (Pendall, 2000; Squires, 2002), increased automobile use (Ewing & Cervero, 2010), environmental degradation (Benfield, Terris, & Vorsanger, 2001; Ewing, 2005), and public health problems (Frumkin, 2004; Moudon et al., 2006).

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