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Sustainable Urban Design and Walkable Neighborhoods

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1. Introduction

Urban development within the United States has not remained stagnant as evident by the development patterns that have evolved over time. When urban development was beginning in the United States there was a mix of land-uses which were necessary due to the limited transportation options available at the beginning of the twentieth century and before. Sustainability was related to self-preservation and was partially focused on the ability to get to the needed destination which was accomplished through use of one of the following available transportation modes; horse, trolley, train, and/or walking. A close proximity to the frequented locations was highly desirable due to the limited range of these transportation modes. However, as the evolution of the automobile occurred and became more attainable by households, urban development began a transformation that would help push housing away from the city center and away from desired destinations such as places of employment, shopping, and school. By the mid 1900s, the private automobile was becoming the primary mode of transportation for households and cities would begin tailoring infrastructure to accommodate the increasing numbers of automobiles in use. Sustainability during the height of suburban neighborhood development has been related to personal space preservation and has had little to do with public transportation, environmental preservation, and household finances.

For middle income families in the United States this reliance on the automobile coupled with living in the suburbs would not become a major financial hardship until the beginning of the twenty-first century when fuel prices would dramatically increase in a short period of time. Based on the U.S. Energy Information Administration website prior to the beginning of the 2005 hurricane season (which runs June through November of each year) the average monthly retail prices for gasoline in the United States Midwest region were consistently below $2.00 per gallon. Beginning with the 2005 hurricane season, fuel prices would progressively increase until the average Midwest retail price reached a monthly average high of $3.99 per gallon in June 2008 (other regions were higher such as the western state of California where fuel prices averaged $4.48 per gallon). Based on the Bureau of Labor Statistics Consumer Expenditure Survey the annual cost of gasoline and motor oil expenditures would rise 69.9% between the years 2004 and 2008; during this same time period the median household income in the United States would remain stagnate. Had the "ideal" suburban home and the need to own a car to commute to and from the suburbs become a unsustainable reality for many households?

This chapter discusses how walkable neighborhoods contribute to the goal of sustainable communities. The topics covered are the history of neighborhood development, defining walkability and measurement tools, and the application of walkability principles into new developments and incorporating walkability into redevelopment projects. The first section provides an overview of neighborhood development in the United States and incorporates such ideas as presented through Clarence Perry's Neighborhood Unit design through the current movement of New Urbanism. The second section explains what walkability is and the elements to consider when trying to assess the environmental qualities that contribute to walkability. The following sections focus on the principles being used in new urban developments that encourage walking and include a case study. The final section discusses opportunities and actions needed to incorporate walkability in existing neighborhoods.

2. Neighborhood development patterns

Within the United States urban neighborhoods can typically be classified into three distinct development types each representing a different attitude towards the mixing of land uses as well has each having different emphasis on the importance of the automobile; the three neighborhood types being discussed are traditional, conventional, and New Urbanism. Traditional neighborhoods were the prevailing type of urban development prior to World War II, conventional neighborhoods flourished during the years following World War II and New Urbanism is a relatively recent design movement that is a response to the sprawl created by the conventional suburban neighbourhood and derives its design elements from the early pre-suburban neighborhoods of the inner city.

Traditional neighborhoods are those neighborhoods built during the first or second ring of development in an urban setting within the United States. Living in these neighborhoods meant that a person lived in or close to the city center where he/she could easily walk to their intended destination which was necessary as the automobile was not widely used or owned by American households prior to the mid 1900s. Traditional neighborhoods are characterized by streets that are laid out on the grid system, close proximity to the city center where there may be a mix of land uses, higher population density, and buildings that are set relatively close to each other due to the smaller lot sizes. These neighborhoods may have historically been serviced by public transportation such as trolleys due to the higher population density which could help subsidize the transportation system. In addition to allowing for easy mobility, there were a multitude of accidental and intentional socialization opportunities due to the tightly built and mixed-use environment. Within these inner neighborhoods the residents could find shopping and employment opportunities as well as housing but it was the functionality of the neighborhoods that determined what type of housing was available. To help maximize proximity to destinations, due to lack of transportation options, housing units could be found above stores or to be tightly clustered together, such as row houses.

These early neighborhoods were not without problems. There were issues with substandard housing, lack of open space and crime to name just three. Housing advocates pushed for housing reform to relieve problems with congestion and to reduce the incidents of widespread illness due to the overcrowding and unsanitary conditions often found within the early inner neighborhoods. The quest for housing reform would begin to push housing outward where there could be an increase in space between homes, where open spaces for

recreation could be incorporated, and where the number of units per lot could be reduced to one. In the 1920s zoning would begin playing a crucial role in this separation of housing from other neighborhood functions such as employment and shopping. The 1926 Supreme Court case of The Village of Euclid vs. Ambler Realty Company declared that exclusive zoning was not unconstitutional and could be construed as police power in safeguarding against conditions that could be considered detrimental to human health. This case would help set the stage for future exclusively zoned developments in which seemingly all types of land uses would be segregated.

Suburban neighborhoods are a product of The Zoning Enabling Act, housing reform and the post World War II era when people wanted to move away from the congestion and crowding of the inner city areas and home ownership became a driving economic goal for many families. Conventional suburban neighborhoods, which have been the predominant type of residential development since the end of World War II, are often referred to as cookie-cutter developments due to the repetitive exterior designs of the homes which typically feature a prominent drive-way and garage. These neighborhoods are zoned primarily for single family homes and the infrastructure is designed to contain streets that are curvilinear and that may terminate in cul-de-sacs which may not be pedestrian friendly. The automobile dominates the transportation system in the conventional neighborhood as stores, schools, and employment may be outside of a reasonable walking distance and out of the reach of the public transportation system. Additionally, walking in suburban neighborhoods may be limited to leisure walking as accessibility of public transportation may be restricted or non-existent due to the distance from the city center and/or lack of ridership that would support the cost of operating a transportation system to the area. The private automobile truly dictates the street system when the development occurs on the urban fringe.

One of the first recognized suburban neighborhoods in the United States is Levittown New York which was created in the late 1940s. This development was initially built in response to the shortage of available housing for returning veterans and their families. With it's sea of single family homes and curvilinear streets it offered affordable housing in five architectural style choices and by 1951 more than 17,000 homes had been constructed in Levittown and the surrounding areas, according to Levittown Historical Society's website (www.levittownhistoricalsocierty.org). The infrastructure pattern and the repetition of exterior architecture of homes built in Levittown, New York would be repeated again in a second Levittown in Pennsylvania in the 1950s. Levittown is often considered the first built suburban neighborhood in the United States and the street pattern and repetition of architecture used in this early suburban development continues to be found throughout conventional suburban neighborhoods today.

There is an important distinction between the early suburban neighborhoods and the present-day suburban neighborhoods, while both emphasize automobile ownership through the prominent inclusion of garages and driveways that dissect sidewalks, the emphasis on automobile ownership is considerably more prevalent in today's suburban developments. Early developments, such as Levittown, featured homes with a single-stall garage (if there was one) that was set even with the front of the home or was slightly offset back from the front of the home while today's developments commonly feature a three-stall garage with a driveway that is nearly equal in width and which may protrude several feet in

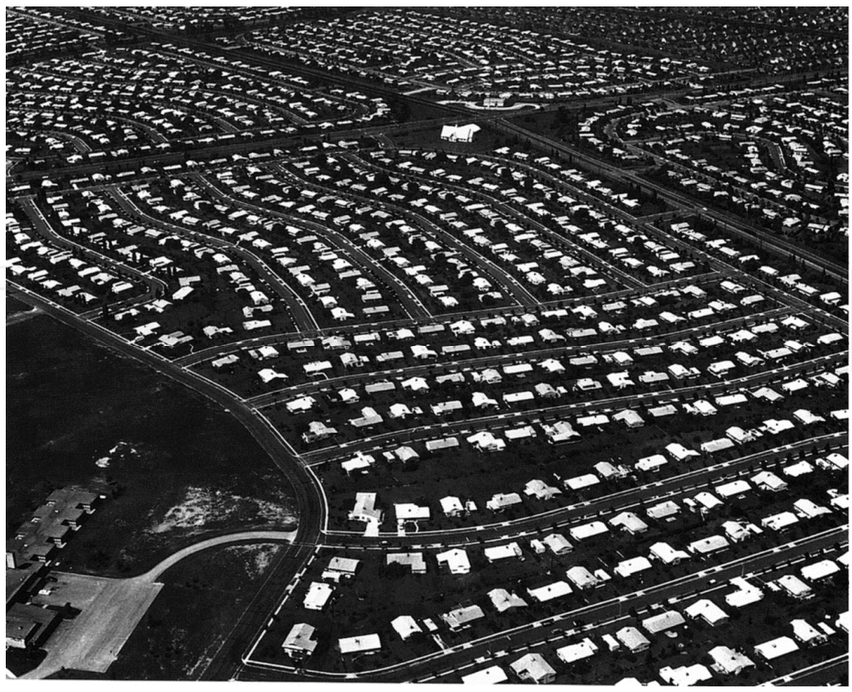

Fig. 1. Levittown, Pennsylvania. Available from:
<http://www.theurbn.com/2010/09/levittown-urban-revitalization>

front of the home's front door. The expanded widths of garages and driveways may lead to an appearance of shorter expanses of sidewalk that are uninterrupted which may give the perception of an unfriendly-pedestrian environment.

A third type of development in the United States is that promoted by the New Urbanist movement which is a response to the sprawl associated with suburban developments. Beginning in the 1980s, a renewed interest in center city living occurred with the regentrification of older inner city neighborhoods. The attraction of the inner city neighborhoods often is the proximity to work, shopping, entertainment, and/or transportation options. In addition to regentrification, the 1980s brought a renewed interest in the creation of neighborhood developments that would incorporate the perceived physical and social dynamics of the pre-suburban neighborhoods which is the basis behind New Urbanism. The New Urbanist developments work to create compatible mixed land uses that do not require segregation of residential spaces from all working and shopping and which encourages walking as a mode of transportation.

Other names associated with New Urbanism are Neo-traditional Neighborhoods or Traditional Neighborhood Developments which are a modern take on the older inner city neighborhoods of mixed uses and increase land development density and Transit-oriented Developments which strive to create communities that are centered on public transportation with the ability to walk to the transit stations. Unlike the early twentieth century mixed-use neighborhoods and the suburbs of post World War II, the focus of New Urbanism's traditional neighborhood development is not primarily on functionality or housing types but is a shift to a more balanced view that neighborhood functionality and housing can be brought together to create a sustainable, livable community.

To create the desired built environment New Urbanism's design principles includes the use of a grid or undulating street system to maximize pedestrian connectivity, incorporates a mix of compatible land uses that includes housing, retail, and public facilities, and works to create a streetscape that encourages human interaction through the incorporation of design elements such as street furniture and architectural details (front porches on residential units) that extend the living space outside (Rohe, 2009) which is different from conventional suburban neighborhoods that are zoned for a single land use and separation of neighbors.

With it's design departure from the standard suburban neighborhood development within the United States, New Urbanism has been a catalyst for reexamining how neighborhoods should function and the impact of design on functionality; the result is a push for and an ongoing discussion of what makes a neighborhood that is economically, socially, and environmental sustainable. One of the ways that New Urbanism promotes sustainability is through the incorporation of a pedestrian-friendly environment which allows residences to be able to choose walking as an alternative mode of transportation when moving about within the development. This is done by offering a variety of destinations to walk to and incorporates streetscapes that encourage walking, in part, through the reduction in sidewalk breaks by placing the garage and driveway behind the house which is accessible by an alley. By removing the garage and driveway from the front of the house it creates a longer continuous span of sidewalk which made lead to the perception that it is safer to walk.

Fig. 2. Suburban Development (left picture) and Traditional Neighborhood Development (right picture) of Lincoln, Nebraska. Left picture shows suburban neighborhood with garages that protrude beyond the front of the house with driveways that intersect sidewalks. Right picture shows a New Urbanist neighborhood with garage access to the rear of the home and unobstructed sidewalks.

While New Urbanism is a fairly recent concept it is not the first attempt at creating sustainable, equitable neighborhoods that work to balance social and environmental equity. A well-known development attempt at creating a sustainable neighborhood was introduced in 1929 by Clarence Arthur Perry who introduced his plans for the Neighborhood Unit. The features of the Neighborhood Unit had at its core public space that included schools, churches, and open space for recreation. The distance each resident had to travel to reach the core or perimeter commercial space was important and was to be no longer than a quarter-mile walk. The types of streets used within the development were also regulated so that the main arterial streets were along the perimeter which allowed for residents to walk with less fear of traffic (Lawhon, 2009).

Another pre-New Urbanist design was that conceived by Ebenezer Howard. In the late 1800s Ebenezer Howard's vision was the Garden City which was intended to be a system of self-sufficient satellite cities connected to each other via a rail line (Daniels, 2009). The intent of the Garden City (located in the United Kingdom) was to alleviate some of the problems of social injustice found in the neighborhoods of the city through the inclusion of employment opportunities, political participation opportunities, and access to a close-in agricultural ring (located around the perimeter of the Garden City). The problem with the Garden City is that while it may have been viewed as a sustainable community it was not able to maintain the goal of social equity. The community was intended to house a range of social classes but due to financial pressures it was difficult to include lower income households. An example of the financial issues could be found in the increased land prices due to housing demand.

Similar to Clarence Perry and Ebenezer Howard, New Urbanists believe that communities should be walkable with a variety of destinations to which a resident can walk to and should incorporate a mix of housing to accommodate a range of incomes, lifestyles, and ages. Allowing for a mix of housing types that can accommodate a range of incomes and ages groups should allow a diversity of individuals the opportunity to choose walking as a mode of transportation however it appears that some New Urbanist communities may have problems similar to Howard's Garden City in that self-selection into the community can mean that housing prices become unaffordable to lower income households. Since the 1980s New Urbanism has been working to change the perception of pedestrian planning through the implementation of physical elements and design that allow walking to be an acceptable form of transportation.

3. Neighborhood design and walkability

One of the many ways that sustainability can be achieved is through the advancement of walkable neighborhoods which is a topic gaining in importance in both the planning and health fields as the activity of walking and the creation of walkable communities can have positive impacts on human health and the physical environment. While the planning and health fields may have initially emphasized walking for different reasons (for health professionals the emphasis was on health improvement and for planning it was for environmental improvement) the goals of the two research fields are ultimately complementary which is to improve quality of life.

To begin this discussion on walkability and its link to sustainable communities it is important to define the terminology used in related research. The three common terms used in planning and health related literature are walking, walkable, and walkability and while they may imply similar meanings there are differences between the terms walking and walkable/walkability. Walking refers to a physical activity done either for leisure or as a mode of transportation and the terms walkable and walkability are used to describe the degree to which the physical environment allows walking to take place. The portion of the physical environment often referred to when studying walkability is the space that is created by the streets, streetscapes, and building that are present in a specific location. A walkability audit is a tool for the assessment of the built environment to determine how it accommodates walking either by all of its residents or a specific target group such as the elderly.

In addition to the above terminology there are also two common assumptions about walking behavior; 1) that most people, when walking as a mode of transportation, will not

walk farther then ¼ mile or five to ten minutes from their origination location, 2) when walking for transportation the route from the origination location to the destination should be as direct as possible. The two assumptions of route directness and length may not apply to both types of walking discussed in the planning and health related literature. As mentioned earlier walking may be for leisure purposes or as a mode of transportation. If done for leisure then route directness and length may not have as much influence on the decision of where and how long a person chooses to walk rather the physical environment may be the primary concern for leisure walkers. For those persons choosing to walk as a mode of transportation then route directness and length may be as important as the environment in which the walking takes place.

Beyond understanding what walkability there is another key element that is fundamental to the creation of neighborhoods that can positively influence a person's decision to walk. That key element is location-efficiency which refers to "…areas near transit, employment centers, or other essential services that allow families to reduce the number and extent of necessary car trips" (Haughey & Sherriff, 2010, p.2). The current suburban development pattern of exclusionary land-use is often far from being location-efficient particularly those developments that occur on the urban fringe. Access to public transportation may be non-existent and places to walk may be limited to other residential units or a nearby public open space when developments occur far from the city center. This lack of location-efficiency is demonstrated through the use of a GIS map (Figure 3) of Lincoln Nebraska showing the placement of grocery stores within a ½ mile radius of residential areas (orange parcels). The older pre-suburban sections of Lincoln which include the south central area of the city have grocery stores that are embedded within the residential areas. The newer section of the city, the bottom and lower right corner of the map, shows that grocery stores are now being located toward the edge of the residential developments. The changes in the location of grocery stores have made a difference in the amount of residential parcels that are within a

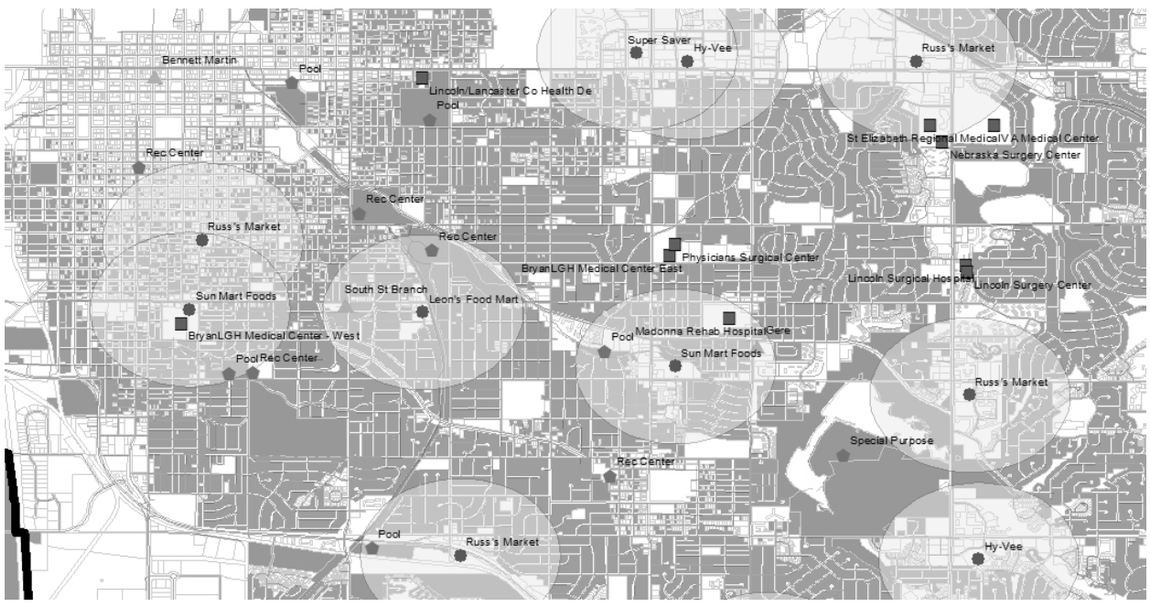

Fig. 3. Grocery store locations in relation to residential development in Lincoln, Nebraska, 2011. Created by Theresa Glanz.

walkable distance. It's important to note that while this map does not indicate there is a lack of grocery stores it does show that that there are gaps in the ability to be able to reach a store via walking. This may be particularly troublesome for elderly people that can no longer drive.

Beyond the terminology and assumptions mentioned above there is also concern within the research on walkable communities regarding the ability to identify the influence of the physical environment on human behavior. Two repeatedly mentioned research concerns are centered on physical determinism and self-selection and whether these are valid concerns. Physical determinism is the theory that the physical environment is responsible for the behaviors that occur within a given culture within a specific geographical location. Self-selection is the theory that an individual selects a location based on personal needs which may be financial, physical, and/or emotional. Both of these theories are mentioned in the research on walkable communities but their influence may be difficult to detect due to the inability to significantly separate observed behavior from personal preferences and from the presence or absence of environmental features.

Physical determinism is often a criticism of New Urbanist communities that make claim to creating environments that promote social community through the incorporation of walkable neighborhoods as there is not a consensus that design alone affects walkability. Self-selection is the ability of a person to select a specific location to live because it meets his/her needs. For example, a person may choose to live in a New Urbanist community because the physical environment is designed in a manner that allows a person to walk with greater freedom than in a conventional neighborhood. The importance of these research concerns are two-fold in that it is difficult to claim with absolute certainty the extent to which the physical environment influences human behavior while at the same time trying to determine the extent that self-selection plays in determining how a human behaves in a particular environment.

Additional criticism of New Urbanism focuses on whether the planners of these developments have actually created an environment that lives up to their claims of decreasing car-dependence, increasing pedestrian friendliness, and increasing the sense of community. Several studies have questioned whether new urbanism "…is too concerned with appearances…while ignoring social concerns…" (Southworth, 1997, p.28). The claim for decreasing car dependency seems to have some merit (Rohe, 2009), however, the claims of increasing socializing and sense of community seem to be harder to prove (du Toit et al., 2007; Hanna, 2009; Lawhon, 2009; Marrow-Jones et. al., 2004; Rohe, 2009; Southworth, 1997).

4. Assessing elements of neighborhood walkability

Measuring walkability is done either through the assessment of the physical environment (objectively) and/or through the gathering of personal perceptions (subjectively) of a specific location. The predominate method of gathering information for determining degree of walkability is done through the auditing of the physical environment which commonly includes features such as "building height, block length, and street and sidewalk width (Ewing, 2009)". These types of audits may also include observations regarding availability of street furniture, landscaping, physical condition of buildings, and cleanliness of area.

A second method of measuring for walkability is done through the gathering of perceptual information. This type of measurement examines a range of perceptual qualities held by the

residents or users of the physical environment. The importance of completing a perceptual survey is that the researcher is able to gather information that is not readily available through the auditing of stationary objects. This allows the researcher to understand how perceptions affect the experience of walking and to gain an understanding of the relationship between perceptions and the physical environment (Ewing, 2009; Wood et al, 2010).

While there is two common ways of gathering information on walkability there are a number of physical criteria that can be or should be examined. First, research regarding walkable neighborhood design is more than just the presence of sidewalks and destinations to walk to it also includes macro and micro-scale features that affect the design of a neighborhood which in turn can affect the desire for physical activities, such as walking, by the residents (Alfonzo et al., 2008; Rodriguez et al, 2006). Macro-scale features include block length and number of intersections while the micro-scale features include street amenities, sidewalks, and conditions of the buildings in the neighborhood (Alfonzo et al, 2008). Together the macro-scale and micro-scale features can affect how the residents perceive the neighborhood environment (safety, pleasantness, accessibility etc) and these features may be found throughout the different neighborhood development patterns in the United States. While conventional suburban neighborhoods can be assessed easily for the above mentioned micro and macro features New Urbanism tries to incorporate physical features that go beyond those typical features by incorporating the following elements (Rohe, 2009):

- A street system that uses a grid or undulating design to maximize connectivity
- A mix of compatible land uses that includes housing, retail, and public facilities
- Single family homes set close to the street, with front porches, and garages set to the rear
- Pedestrian amenities and public open spaces

These features are incorporated into New Urbanism with the assumption that they (features) will encourage walking by the residents and socializing between neighbors. While New Urbanism, particularly at the neighborhood and street level, works to incorporate many of the design features that are thought to increase the desire for walking; within the literature on New Urbanism there is not a consensus that design alone affects walkability rather there is agreement that New Urbanism has created a lively debate about what makes a neighborhood/community sustainable, livable, and pedestrian-friendly (Morrow-Jones et al, 2004).

In addition to assessing the presence of sidewalks and building types available in a neighborhood Reid Ewing and Susan Handy (2009) have described five qualities that have particular importance when researching environmental perceptions; imageability, enclosure, human scale, transparency, and complexity. The quality of imageability refers to those features which help create an image of a particular place. This is highly personalized as individuals internalize perceptions differently; however, the social-cultural environment in which a person lives can create perceptual similarities when viewing an environment. Enclosure refers to the space created by the physical environment. Buildings, streets and sidewalks, and greenery such as trees can all provide definition of space. Ewing and Handy (2009) found that human scale was much more difficult to define than the previously two

mentioned (imageability and enclosure) qualities. In part this is due to the differing opinions about what creates "human scale". Eventually Ewing and Handy (2009) list one of the definitions of human scale as "The size or proportion of a building element or space relative to the structural or functional dimensions of the human body. Used generally to refer to the building elements that are smaller in scale, more proportional to the human body, rather than monumental (or larger scale)."

The quality of transparency is the ability of the outdoor environment to project life within the indoor environment. It is a perceptual quality that allows a person to imagine what activities are taking place outside the direct line of sight. For instance, "courtyards, signs and buildings convey specifics uses (schools and churches) add to transparency" (Ewing and Handy, 2009, p.78).

Complexity is another quality that adds to the perception of the physical environment. This quality relates to the variation found within the environment and the ability of a person to internalize the information. Too little information creates boredom and too much creates information overload. Complexity is created by variations in the development pattern through varied setbacks, building orientations, and constructed buildings. Street furniture, signage, and the presence of and the activity of people all help to create complexity (Ewing and Handy, 2009).

In the book "Inclusive Urban Design: Streets for Life" by E. Burton and L. Mitchell (2006), there are six components discussed that promote walkability in a community. These components build on and expand the qualities mentioned by Ewing and Handy and they (components) are a mix of the physical as well as the perceptual. The following is a list of the components:

- Familiarity – refers to the extent that streets are understandable and recognizable.
- Legibility – refers to the ability of streets to help persons understand where they are at and which way they need to go.
- Safety – refers to the extent to which streets enable people to use, enjoy, and move around without fear of tripping or falling, being run-over or attacked. Safe streets have buildings facing onto them, separate bicycle lanes and wide, well-lit, plain, smooth surfaces.
- Comfort – refers to the extent to which streets enable people to visit places of their choice. Comfortable streets are calm, welcoming and pedestrian friendly.
- Accessibility – refers to the extent that streets enable a person to reach, enter, use and walk around places they need or wish to visit.
- Distinctiveness – refers to streets that give a clear image of where the person is, what are the streets uses and where they lead. (Overlapping similarities with imageability and complexity.)

In addition to the physical elements and perceptual qualities that affect the walkability of an area there are lesser discussed, but no less important, qualities that could be considered when studying walkability. Those qualities are the destination distance – how far does a person need to travel before they reach their intended destination; visit-ability – is the intended destination accessible by persons with varying physical abilities and weather – is the weather conducive to walking – year round, a portion of the year, or rarely.

5. Case Study: Neighborhood design and social interaction

In this section, we present a case study to show the relationship of walkable neighborhood design and social interactions. Sustainability of a neighborhood clearly contains the collective attributes of social interactions among residents. As shown (Cuthill, 2009; Dempsey et.al, 2009; Lehtonen, 2004), social sustainability is an important dimension of 'sustainable development', and is closely linked with environmental and economic sustainability.

In the Fall of 2010 a survey was undertaken in Lincoln, Nebraska to answer questions about the relationship between the specific variables of social interaction and walkability when the development design differed. Specifically the study sought to answer questions regarding 1) the amount of social interaction that occurs in two different types of neighborhoods, 2) whether walking by the residents occurs more frequently when the neighborhood design is based on New Urbanism principles, and 3) if a relationship between social interaction, walking, and urban design can be detected. The neighborhoods chosen were located in Lincoln, Nebraska and were comparable in age of development and housing prices. Sixty-three surveys were mailed out to households in the Village Gardens and the Wilderness Hills neighborhoods and of those 44.4% were returned.

Two neighborhoods were chosen for this case study; Village Gardens and Wilderness Hills which are located along the southeastern and southwestern edges of Lincoln Nebraska. Village Gardens is considered a Traditional Neighborhood Development which began construction in 2006 is located on the site of a former nursery. In addition to housing, Village Gardens has several specialty shops and a hotel that has been constructed and are now open for business; these are located in the northwestern corner of the development. Presently, the homes in Village Gardens consist of single-family homes and townhomes. The promotional website does indicate that apartments will be built however these will be restricted to the area designated as the Village Center (business center). The mix of housing is intended as a way of integrating a mix of incomes and lifestyles as well as being able to accommodate the changing needs of different life stages (Village Gardens, n.d.).

The second neighborhood used in this study is Wilderness Hills, a conventional suburban neighborhood, which is located along the southwestern edge of Lincoln Nebraska and is situated on former crop land. Construction in this development began in 2007 with the original phase nearly built-out and with subsequent development phases in the construction phase. Commercial development has occurred in the northwest corner of Wilderness Hills. Presently there is a big box retailer, a bank, and several constructed but unoccupied shops. The majority of homes built in this area are single-family homes with a few town homes present. Several of the lots in the second phase of development that had been designated for town homes have since been converted to allow for the construction of patio homes (these are homes that do not have to meet the minimum square footage requirements established for the single family homes within the development).

Four types of research methods were used to gather information for the case study; literature review, surveys, a walkability audit, and field observations of the two neighborhoods (Glanz, 2011). For data on social interaction a written survey was mailed to households in the Village Gardens and the Wilderness Hills neighborhoods. The survey was divided into three sections which included questions regarding interaction with neighbors,

frequency of walking in the neighborhood, neighborhood satisfaction, and demographics. Participants are not identified in the results, however, in order to know which neighborhood the survey came from an identifier number was used on each survey; SE1 meant the survey came from Village Gardens and SW3 meant the survey came for Wilderness Hills.

To obtain information on the walkability of each neighborhood a walkability audit was completed for several streets in each of the two neighborhoods as well as photographs were taken of the areas. The walkability audit instrument was developed and was used to create an inventory of items as they related to sidewalk availability, location of house from street, handicap accessibility from the street, and presence or absence of people. This audit focused on elements and conditions that were readily observable which have the potential to influence a person's decision to walk. The following is a list of the conditions and elements that the walkability audit focused on:

- Surface conditions of the paved walking surface
- Path obstructions that would interfere with the ability to walk on the paved surface referenced above
- Segment features that may add to or detract from a person's desire to walk such as bus stops, street trees, street lights, and on-street parking
- Presence of litter, graffiti, or deterioration present in the observed area (condition of surroundings)
- The type of litter and disorder that may be present
- Whether people were visible and/or active in the observed area
- What, if any, crossing aids exist for aiding in the crossing of streets in the observed area
- The types of buildings and land uses that were observable
- The walking/cycling environment of the street segment which includes observing whether there were neighborhood watch signs, if there are bicycle lanes present, density of street trees, visibility of items such as trash cans or benches, and the depth of the building setbacks from the sidewalk
- Rating the overall attractiveness of the street segment which ranged from not attractive to very attractive

The features and conditions mentioned above work together to create an environment that a person may or may not find attractive to walk in and more importantly these can create an environment that a person would not feel safe in which in turn may deter a person from being outside.

The survey results revealed that there is a not a huge difference in the amount of social interaction among residents even when the neighborhood design differs. However, it does need to be noted that while the survey indicated that the respondents from both neighborhoods were comparable in knowing the same number of people and the amount of socializing that occurred; the respondents from the Traditional Neighborhood Development were generally more satisfied with the number of the acquaintances and friends they had within the neighborhood. (Glanz, 2011)

Two other points revealed by the survey were that the respondents in the conventional neighborhood ranked it higher as a good place to raise children (72.2%) then the TND (50%) however at the same time the respondents in the TND were generally more satisfied (80%) with their safety from threat of crime then those in the conventional neighborhood (61.1%).

It could be speculated that a higher satisfaction rate with the safety from crime in the TND could be due to having a higher satisfaction rate with their social relationships. As far as the difference in viewing the neighborhoods as a good place to raise children it may be attributed to the residents of the TND being older and as the survey revealed there are no children in the households in the TND that responded to the survey.

In addition to having greater satisfaction with social relationships this research showed a definite increase in the amount of walking that occurs in the TND over the conventional suburban neighborhood. Of the respondents, 80% of the TND respondents walked seven days a week while 61% of the conventional neighborhood respondents walked one to two days a week. The survey also revealed that the residents within the TND (80%) seen a greater frequency of people walking daily in the neighborhood then the conventional neighborhood (55.6%). This does confirm what is revealed in other published articles about walking and TNDs (Rohe, 2009). While this research does show that walking occurs with greater frequency within a Traditional Neighborhood Development it does not show if the design of the neighborhood has influenced the decision to walk or if the respondents are inclined to walk more than the residents in the conventional suburban neighborhood.

The physical audit of the two neighborhoods has revealed differences in the connectivity of the existing sidewalks. The sidewalk connection within the Wilderness Hills neighborhood was more complete and there was greater handicapped accessibility from the street as driveways could be used to reach the sidewalks. At the same time the resident survey showed a higher amount of walking in Village Gardens while having a lower amount of sidewalk connectivity. This does raise the question of the importance of the existence of sidewalks in residential neighborhoods.

Both of the neighborhoods in this study have a business center connected to them. Retail is a primary business category of both centers but there are important differences. The Wilderness Hills business center has several completed but empty buildings and does have the appearance that it is set up for predominately retail use with limited room for other types of business. This type of business restriction may limit the number of residents from the adjoining neighborhood who would walk to it. Village Gardens does have retail as a predominate business use but as indicated by the signs posted in the undeveloped areas of the business center there is the potential to create businesses that may encourage residents of this neighborhood to walk to them. A few of the empty lots are designated as areas that could be restaurants and one is marked for a specialty grocery store. Village Gardens has even been designed so that the distinction between residential and business uses is not as clear as in a conventional suburban neighborhood. This is done by incorporating housing units into the business center through the use of apartments above some of the stores and by having an alley instead of a street separate some of the residential units from the businesses and parking. This area of Village Gardens is more reflective of what Jane Jacobs liked about the inner city urban life – a mix of uses that includes residential. By mixing residential and businesses Jacobs coined the term “eyes on the street” which to her helped create a sense of security and was a factor in creating a sense of community.

If the presence or absence of sidewalks cannot explain the difference in the amount of walking that occurs than other factors such as the social aspects of the neighborhood should

be examined with greater detail. This study does indicate that social factors such as satisfaction of neighbor relationships and safety from threat of crime may help explain why walking occur more often in different types of neighborhoods. As noted in an article written by Alfonzo et al. (2008, p.31) "It is unlikely that the built environment affects decisions to walk…rather…the built environment may support decisions to walk through the accumulation of several discrete features that together create a particular character or quality (safety, pleasantness, etc.)."

6. Conclusion

The past twenty years have seen only a handful of federal policies designed to help communities increase walking and biking opportunities within the United States. The Intermodal Surface Transportation Efficiency Act (ISTEA), the Transportation Equity Act for the 21st Century (TEA-21) and the Safe, Accountable, Flexible Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (Handy and McCann, 2011) are all policies designed to enhance alternate transportation design. These policies however do not require communities to develop walkable surfaces rather they are funding sources which communities can use to help create walkable surfaces.

There are also no policies at the federal or state levels of government that require planners and developers to create compact, mixed-use, pedestrian neighborhoods nor are there policies that require the redevelopment of inner city areas over expanding cities onto greenfields. Currently the primary sources of support for New Urbanist communities are planners and developers that are willing to push for a form of neighborhood development that has not been common for several decades.

In addition to the limited federal policies on walking and biking there is also the issue of the public's response to compact, mixed-use developments. Information on public opinion towards compact development is not as readily available as the literature that expresses planners' opinions of this type of development. If a development is to succeed especially when the design does not fit the norm of a sprawling subdivision then planners need to understand who is most attracted to these types of developments, why are they attracted to them, and who is actually living in these developments.

With a lack of policies that mandate compact, mixed-use, pedestrian friendly neighborhoods there are two tools that are especially important for planners – education and marketing. With fuel prices rising now may be an especially important time for planners to educate the public about New Urbanism principles and how these principles, if implemented, can positively impact a person's life particularly in health and financial matters. The second tool, marketing, is important in helping to sell the concept of compact, mixed-use neighborhoods to people who may be interested in these types of developments but may not know of their existence.

This does leave the question as to whether the incorporating of New Urbanism principles should be required by public policy or whether it should be left to the free market to determine its usage. Presently these principles should be left to the free market but through

better education of the public these principles may be more readily accepted by the general public as a means of helping them achieve a healthy and a less car-dependent lifestyle.

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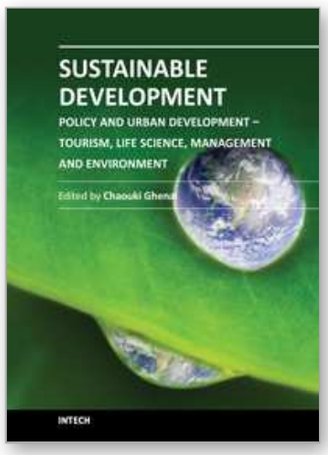

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The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

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