Policy Brief 9b
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The Influence of Urban Form on Travel: The Impact of New Urbanism

The Transportation Goals of New Urbanism

New Urbanism is a comprehensive design approach to solving many of the problems frequently associated with urban sprawl (Duany, Calthorpe, Katz). The Congress for New Urbanism (CNU) acting as the "trade association" for new urbanist professionals has developed 27 principles or goals for addressing these problems. Eight of these goals are specifically related to transportation and human mobility. Most new urbanist solutions are physical design techniques that seek to change urban form with an implied understanding or belief that they will reduce the need for the auto and increase use of other transportation modes (transit, bicycling and walking). The success of the new urbanism in dealing with sprawl is based on implementing a series of interrelated and integrated design moves to change urban form. Urban form changes advocated by new urbanists can be summarized as increasing density, mixing of uses and use of a grid network for streets.

Through these form changes, increased equity, an enhanced physical experience and environmental protection are explicit goals frequently found in new urbanist literature. Increased transportation efficiency is not directly addressed, though it is implied as a benefit of these changes to urban form. In terms of transportation, increased equity is expressed as providing more choices to everyone, not just the economically disadvantaged. Efforts to make transit, bicycling and walking viable options through modifications to urban form are central to new urbanism. In the environmental arena, new urbanism seeks to reduce energy use and pollution by reducing the need for the auto and preserving the ecological landscape and agricultural lands by increasing density and adopting land use patterns that use less land. The hallmark of new urbanist thought, however, is in improving the urban experience or quality of life. Design moves to create a stronger sense of community are prevalent in the literature. Rearranging urban form and creating alternative transportation modes to the car is key to

creating human scale, increasing human interaction and to improving visual attractiveness. Implicit in this idea is that less time will be spent in cars thus avoiding congestion, a major detractor from quality of life.

Efficiency or the wise use of one's time is less clearly a goal. New Urbanists urge higher densities, mixing of uses and grided street patterns that theoretically reduce travel time and congestion. While this is never directly stated, it is frequently cited as a rationale for supporting planning strategies and design features that substantially change urban form. (Crane, 2000)

Inconclusion: Study Results Both Support and Refute New Urbanist Claims of Transportation Impacts.

In recent years, a substantial amount of research has been conducted examining the impact of urban form on transportation. Researchers have specifically examined three new urbanist design strategies and their presumed transportation impacts.

1. Using a street grid layout instead of the traditional suburban street hierarchy to increase accessibility to more places and hence reduce reliance on a few major arterials to get places. With a grid network and higher accessibility, distance to destination should be shorter, hence sorter trips. Grids should also have the benefit of reducing congestion on major arterials.
2. Increasing density and mixing of uses to concentrate activities so that more destinations can be completed in one trip. Trip generation rates should be reduced and modal shares for non-auto options should be increased.
3. Use of traffic calming devices such as narrower streets and speed bumps should slow traffic therefore increasing the cost of driving. With a higher cost to driving, other modes should be more competitive.

Crane (2000) provides a framework for classifying and evaluating research examining the relationship between urban form and transportation. He cites three categories of research with increasing levels of rigor and sophistication: simulation studies, descriptive studies and multivariate statistical studies. A review of research in each category show that simulation and descriptive studies tend to be

supportive of new urbanist claims whereas multivariate studies are inconclusive or refute such claims.

Simulation studies construct situations in simplified and tightly controlled environments where land use patterns and design features can be linked to travel. This type of study makes certain assumptions concerning behavior and then applies those assumptions to alternative situations to see what happens. The weakness in these studies is that they ignore the possibility that behaviors may change in the different situations. They therefore ignore the potential feedback that environmental changes may have on individual traveler behaviors (Crane, 2000).

In a simulation by Kulash (1990), VMT were reduced by 57% with a traditional grid pattern compared to a conventional suburban street network. A variety of similar studies by McNally and Ryan (1993), Rabiega and Howe (1994), and Stone, Foster, and Johnson (1992) also found similar results. In these simulations, the grid pattern brought destinations and origins closer together. With the assumption that trips were constant, it was axiomatic that VMT should drop. A study conducted in Portland by 1000 Friends of Oregon is frequently cited and is important in that it used an integrated land use transportation model of the type used by regional planning agencies. This study evaluated three scenarios, a no build option, a highway only option and a Land Use Transportation Air Quality Connection (LUTRAQ) option. This option included several LRT lines, TOD design features in the LRT corridors along with higher residential densities as well as higher parking costs and subsidized transit passes. This modeled alternative found a doubling in the mode share for transit, with a substantial drop in VMT by car. An examination of street connectivity in Portland by Daisa, Kloster and Ledbetter (1998) found that higher levels of street connectivity improve traffic flow on arterial streets. In this simulation, traffic volumes along arterials were reduced along with vehicle hours of delay, vehicle miles traveled and average trip length.

Descriptive studies observe and describe behavior. While they do not attempt to explain or interpret the results, they can provide important insights. Friedman, Gordon and Peers (1992) observed travel behavior in San Francisco

Bay area communities. These communities were categorized based on whether they had a separation of land uses and a hierarchy of roads (suburban) or a greater mix of uses and a grid street pattern (traditional). The researchers found that auto trips were 60% higher in the suburban communities for all trips and 30% higher for nonwork trips.

Other studies by Dunphy and Fisher (1996) and Rutherford, McCormack and Wilkinson (1996) also found that there were higher levels of transit use and lower auto travel in higher density communities. Rutherford, McCormack and Wilkinson (1996) concluded that their study supports the idea that mixed-use neighborhoods can reduce the amount of auto travel for most households. Neither of these studies examined the impact that income may have on travel behavior.

Multivariate statistical studies examine observations and attempt to explain behavior. In general, these more methodologically sound studies refute new urbanist claims or are inconclusive concerning the travel impacts of changing urban form. In a study by Handy (1996), auto travel diary data were examined for pairs of Bay area cities. Results showed that neighborhoods closer to shopping destinations generated more auto trips suggesting that increased accessibility as measured by proximity, density and street patterns found in new urbanist neighborhoods, might actually increase rather than decrease auto trip making.

Cervero and Gorham (1995) examined traditional and suburban pairs of neighborhoods in both the Los Angeles and San Francisco metro areas to compare both work and nonwork trip generation rates. Cervero and Gorham found that street layout mattered in the San Francisco area traditional neighborhoods. They found that these neighborhoods had higher transit, walking and bicycling modal shares than their suburban counterparts. This was not the case in the traditional communities in the Los Angeles metro area, which is characterized by greater dispersion and lack of effective transit. The authors concluded that the surrounding regional land use and transportation patterns may have an affect on transportation and present a challenge to creating new urbanist communities in regions with pre-existing and non-supportive land use and transportation patterns.

In an interesting comparison of traditional and suburban neighborhoods, Kulkarni (1996) found that income was a much better predictor of differences in trip generation than urban form. This suggests that design might have little impact on travel behavior unless incomes or other individual characteristics are associated with certain types of design. This raises the issue of how important preferences are in the land use transportation issue. Kitamura, Mokhtarian and Laidet (1997) included attitudinal measures in a study that regressed socioeconomic and neighborhood characteristics against trip frequency and mode choice. They found that attitudinal measures (such as attitudes towards specific residential and travel life styles) explained travel behavior better than land use or urban form factors. This raises a key question that only additional multivariate studies can answer. Do residents in neighborhoods characterized by new urbanist form drive less because of their neighborhood characteristics, or do these neighborhoods attract people who prefer to drive less and want transportation options? That people exhibiting these preferences are attracted to new urbanist neighborhoods seems intuitively obvious.

Some key conclusions emerge from these studies. Design efforts to affect the cost (as measured by time) of auto travel by affecting trip distance and speed can have conflicting results. Shortening trip distance (as in with a grid network) can increase or decrease trip generation. Slowing travel speeds through various traffic calming techniques consistently reduces trip generation. Secondly, geographic scale is important. Much of the research has been conducted at the neighborhood scale, however as Cervero and Gorham's (1995) work shows, the regional context matters. New urbanist designs within the context of a supportive region are more likely to meet auto travel reduction goals than those in non-supportive regions. Lastly, individual preferences concerning residential locational choice may prove to be more important than urban form in affecting transportation behavior. While most simulation and descriptive studies show that transportation goals are achieved in new urbanist or traditional neighborhoods, this may be more directly correlated to behavioral preferences of people living in these places. Preferences for reduced auto travel and transportation options may be the critical

independent variables affecting the dependent variable of transportation. New urbanist form may simply allow these preferences to be realized. The bottom line appears to be that new urbanist designs provide consumers with alternative choices for living and transportation. Further research examining the relationship between these behavioral preferences and urban form and the impact on transportation is critical.

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