Remaking Minnie Street: The Impacts of Urban Revitalization on Crime and Pedestrian Safety

Kristen Day, Craig Anderson, Michael Powe, Tracy McMillan and Diane Winn

Journal of Planning Education and Research 2007; 26; 315
DOI: 10.1177/0739456X06297257

Remaking Minnie Street

The Impacts of Urban Revitalization on Crime and Pedestrian Safety

Kristen Day, Craig Anderson, Michael Powe, Tracy McMillan, & Diane Winn

Abstract

Urban design is frequently identified as a tool to reduce crime and improve traffic safety in urban neighborhoods. In this "before" and "after" evaluation, we assess a major urban revitalization in the Minnie Street neighborhood in Santa Ana, California, in terms of its impacts on crime and pedestrian safety. Conclusions suggest that urban design can help to improve crime and traffic safety in poor urban neighborhoods but that other factors must also be considered.

Keywords: *urban; low income; revitalization; crime; safety; pedestrian*

Urban design frequently surfaces as a panacea to address the many problems facing low-income urban neighborhoods—problems tied to crime, fear, traffic safety, and quality of life. Jane Jacobs and Oscar Newman are only the most visible proponents of this line of thinking. Supporters include numerous planning and design professionals and scholars and various federal funding programs, such as Hope VI, Weed and Seed, and others.

Many reasons explain the emergence of built environment changes as a favored strategy to combat urban ills. Changes to the built environment are often dramatic. They signal clearly that "something is being done" to address a problem. And although built environment changes can be expensive, they are often less costly than long-term investments to improve education, increase job training, enhance policing, and so on. Finally, built environment solutions to urban problems may hold special appeal to middle class professionals and to politicians, since such solutions promulgate middle class norms and values that emphasize appearance and order (Day 2003; Pyatok 2000).

In this article, we evaluate an extensive renovation of the built environment in the Minnie Street neighborhood in Santa Ana, California—a low-income, predominantly Latino neighborhood plagued by traffic concerns and crime (Hicks 2001). Through this renovation, the city hoped to "stop the downward spiral" of the neighborhood (City of Santa Ana, 2004a) by reducing crime and fear and by improving pedestrian safety and quality of life. Our "before" and "after" evaluation examines the impact of built environment changes on crime and pedestrian safety in this poor, urban neighborhood.

▶ Literature Review

Pedestrian Safety

Improvements to pedestrian safety emphasize the "three e's" of education, enforcement, and engineering (or built environment) solutions (Transportation Alternatives 2002). In 2001, youth under sixteen and older adults over seventy represented almost 40 percent of all pedestrian fatalities (Shankar 2003). Reducing traffic speed and

Journal of Planning Education and Research 26:315-331
DOI: 10.1177/0739456X06297257

Kristen Day is an associate professor in the Department of Planning, Policy, and Design at the University of California, Irvine.

Craig Anderson is an epidemiologist in the Center for Trauma and Injury Prevention Research, University of California, Irvine.

Michael Powe is a doctoral student in the Department of Planning, Policy, and Design at the University of California, Irvine.

Tracy McMillan is an assistant professor in the Department of Community and Regional Plannning, University of Texas at Austin.

Diane Winn is the research manager in the Center for Trauma and Injury Prevention Research, University of California, Irvine.

volume is key to improving pedestrian safety for persons of all ages. These strategies are particularly important for these two population groups, who have reduced reaction times and ability to judge speed and distance. Reductions in vehicle speeds are associated with reductions in the number of pedestrian-vehicle collisions (Anderson et al. 1997; Jacobsen et al. 2000; Jensen 1998; Pasanen 1992, 1993; Pitt et al. 1990; Wazana et al. 1997). In a study of pedestrian crashes involving children aged fourteen years and younger from central Orange County, California, vehicle speed was a key predictor of pedestrian injury, while controlling for multifamily housing, vehicle and pedestrian volume, and parked cars (Jacobsen et al. 2000). Vehicle speed also impacts the severity of injury. A study of one thousand urban pedestrian crashes recorded in the National Highway Traffic Safety Administration Pedestrian Injury Causation Study database for persons under twenty years of age found the risk of serious injury or death increased from 2.1 at speeds of twenty to twenty-nine miles per hour (baseline is zero) to 7.2 at speeds of thirty to thirty-nine miles per hour and to 30.7 for speeds of forty miles per hour or more (Pitt et al. 1990; also see Pasanen 1992).

Pedestrian safety is especially problematic in urban environments, where motorized vehicle traffic may be faster and busier. Pedestrians are more likely to suffer motor vehicle accidents and deaths in large urban areas compared to other places (Insurance Institute for Highway Safety 2005). Although pedestrians account for 11 percent of all motor vehicle deaths nationwide, in cities with populations over 1 million, pedestrians represent about 35 percent of motor vehicle deaths. Higher pedestrian injury rates among black versus white children are linked to characteristics of urban environments such as higher housing density and urban street characteristics, where black children are more likely to live (King and Palmisano 1992).

Research finds that changes to the built environment can help to improve pedestrian safety by reducing vehicle speed and volume and by reducing conflicts between pedestrians and vehicles. A recent report by the National Highway Traffic Safety Administration found that approximately 75 percent of all pedestrian fatalities from 1998-2001 were at nonintersection locations (e.g., marked or unmarked midblock crossing; on road shoulder). Over half of the pedestrian fatalities at nonintersection locations were on roadways with no crosswalks. Lighting conditions also played a role in pedestrian fatalities (Shankar 2003). A recent comparison of the effect of marked versus unmarked crosswalks at uncontrolled intersections on pedestrian crashes found no difference in crashes on roadways with less than ten thousand average daily traffic (ADT). (These conditions are similar to those on Minnie Street.) For multilane roadways with greater than twelve thousand ADT, marked crosswalks at uncontrolled locations had higher associations with pedestrian crashes than did unmarked crosswalks. The presence of a raised median or raised crossing island was associated with a lower pedestrian crash rate at multilane, uncontrolled locations regardless of whether a crosswalk was marked or not (Zegeer et al. 2005).

In contrast, a recent study in the United Kingdom found that an increased density of traffic calming features (speed humps, road narrowing, and road closures) was associated with a greater absolute reduction in child pedestrian injury rates and with a reduction in the relative inequalities of child pedestrian injury rates in two cities (Jones, Lyons, John, and Palmer 2005). In addition, a synthesis of research on pedestrians and traffic control measures reported that simplifying the crossing task for pedestrians by converting two-way streets to one-way, led to a reduction in pedestrian crashes in several U.S. and Canadian cities (Zegeer and Zegeer 1988). These findings suggest that while making the roadway more legible to pedestrians and drivers is important for pedestrian safety, the most effective treatment is likely context specific.

In urban neighborhoods, both perceived and actual pedestrian safety may shape whether residents are likely to be comfortable and active in their neighborhoods. In the current study, we examine the impacts of the changes to the Minnie Street neighborhood environment on perceived pedestrian safety and on factors linked to actual pedestrian safety, including vehicle speed and volume.

Crime and Fear of Crime

Crime and fear of crime are pressing issues in many urban neighborhoods. Fear of crime is especially high among low-income individuals and among people of color, including Latinos (Bureau of Justice Statistics 2002; Evenson et al. 2002). Nearly 60 percent of nonwhite respondents report that they are fearful walking in their own neighborhoods at night (Bureau of Justice Statistics 2002). Fear is especially significant for women (Day 1999, 2000; Gordon and Riger 1989; see also Atkins 1989; Ross 2000).

Planning and design scholars and practitioners have long linked design of the built environment with safety from crime. This tradition begins with classic work by Jane Jacobs (1961), Oscar Newman (1972), and C. Ray Jeffrey (1971) and continues to the present day (for examples, see Brantingham and Brantingham 1993; Eck and Weisburd 1995; Loukaitou-Sideris 2005; Loukaitou-Sideris, Ligget, and Iseki 2001; Nasar and Fisher 1993; Skogan 1990; Taylor and Harrell 1996; Wekerle and Whitzman 1995; Zelinka and Brennan 2001). A wide range of built environment features may help to reduce fear and enhance safety. These include features that make neighborhoods look "defended" (attractive landscaping, clear assignment of semipublic spaces to specific units, etc.), design elements that discourage disorder (no graffiti, improved maintenance, etc.), and opportunities for surveillance (seating near outdoor public spaces, windows overlooking the street, etc.).

Fear of crime is not the same as actual crime. In fact, neighborhoods may face problems with high levels of fear, tied, for example, to social or physical incivilities (poor maintenance, public drinking, etc.), with or without high levels of actual crime. Likewise, residents may perceive relative safety in neighborhoods with high crime rates. We evaluate the impacts of the Minnie Street renovation in terms of its impact on both fear of crime and on crime itself.

► Background: The Minnie Street Neighborhood

The Minnie Street neighborhood includes both sides of two facing city blocks. In 2000, the neighborhood comprised forty-eight, two-story apartment buildings, each with ten to eighteen apartments (City of Santa Ana 2002). All Minnie Street homes are apartment dwellings. Apartment buildings are organized around open, internal courtyards. The apartments were built in the 1960s as off-base housing for Marines. Later, the buildings were sold to private developers and opened to civilian families (Hicks 2001; Mena 2002).

Over time, building owners became absentee landlords, and apartments deteriorated from heavy wear and poor maintenance (Mena 2002). Graffiti and peeling paint proliferated. Landscaping suffered from neglect, and trash piled up outside dumpsters and behind chain link fences. Poor lighting made the area dangerous at night, and the neighborhood attracted drug dealing, gangs, and prostitution. Shootings and open drug dealings were common (City of Santa Ana 2004b; Hicks 2001; Mena 2002). Minnie Street was widely regarded as one of the toughest neighborhoods in Santa Ana.

Pedestrian safety was also a concern on Minnie Street. Overcrowded apartments (average of 5.25 residents per one-bedroom unit in 2000) and the lack of convenient parks or playgrounds left children to play on or near the streets or in bleak courtyards or parking lots. High traffic volumes in the neighborhood presented a constant threat. A child was killed by a vehicle on Minnie Street in 2000 (Hicks 2001). Railroad tracks behind the apartments further increased danger, since children and adults regularly cut across the tracks to reach nearby destinations.[1]

In the early 1990s, Minnie Street residents organized to demand improvements to their neighborhood. The Cambodian Family, a local community-based organization, surveyed neighborhood residents to determine what changes were needed most. Survey findings showed that residents were most interested in improving safety from crime and in increasing educational opportunities for local children. Conditions changed with the opening of a Minnie Street police substation in 1996 in a converted apartment unit (City of Santa Ana Police Department 2005). Around the same time, a new church-sponsored after-school learning center opened in the neighborhood to serve local children.

The City of Santa Ana spearheaded a partnership between residents, building owners, and city departments to renovate the physical environment of the neighborhood (City of Santa Ana 2003). Owners restored the interiors of apartment units with loans from the city, and the city renovated the street and buildings on Minnie Street (City of Santa Ana 2002).[2] Most renovations occurred between 2000 and 2001.

To reduce traffic volume and to slow speeds, Minnie Street itself was converted to a one-way, meandering street, and parallel parking was converted to angle parking (Figure 1). A wrought iron fence was added to separate apartment buildings from the railroad tracks. The appearance of the neighborhood was improved to make it appear more defended and cared for and to improve residents' quality of life. Landscaping and fencing were replaced, building facades received new paint and awnings, and alleys and parking lots were resurfaced. Overhead electric wires were moved underground, and dumpsters were enclosed. The city added street furniture and lighting, constructed an attractive new neighborhood "entrance," and enhanced the "front porch" sitting areas and courtyards outside each apartment building (City of Santa Ana 2003). Finally, apartment interiors were upgraded by building owners between 2001 and 2006. Actions were adopted to ensure that the renovation did not gentrify or displace residents (Perkes 2001; Reza 2001). To acknowledge its transformation, residents adopted a new name for the neighborhood, "Cornerstone Village," symbolizing their hope that the project would become a model for other neighborhoods (Hicks 2001).

In the following sections, we systematically evaluate the impacts of the renovation of the Minnie Street neighborhood. This renovation includes the changes to Minnie Street itself as well as to its apartment buildings, surrounding sidewalks, and parking treatments, as summarized above. We hypothesized that the renovation of Minnie Street would be associated with:

1. increased perceived pedestrian safety and increased actual pedestrian safety for Minnie Street residents;
2. improved perceived and actual safety from crime on Minnie Street; and
3. increased walking on Minnie Street.

Increasing walking was not a specific goal of the Minnie Street renovation. Given the tremendous recent interest in the relationship between urban design and increased physical activity (see, for example, Active Living by Design 2004; Active Living Research 2004), however, we were interested in whether the renovation would be associated with increased walking in the neighborhood.

► Method

The study comprised a before and after evaluation. Before data were collected in fall 2000 and after data in spring 2005.

Figure 1. *Minnie Street before (left) and after (right) renovation.*
Source: Gorton et al. (2005); used with permission.

Data collection included: (1) a survey of Minnie Street residents, (2) observation of pedestrian and vehicle traffic, and (3) analysis of police crime data. Multiple partners were involved in the study at various stages, reflecting its extended time frame.

Study Site

The study area is the portion of the Minnie Street neighborhood between McFadden Avenue and Wakeham Avenue (Figure 2). This is the area in which most renovations occurred. The nearby neighborhood (within one-half mile) is a mix of high-density, multistory apartment buildings, single-family dwellings, retail markets, small businesses, and light industry. An elementary school is located two blocks away. Residents must cross two major streets to reach the nearest park, located one-half mile away. A grocery store, ethnic food markets, several small shops, family-owned restaurants, an automotive repair shop, minimarkets, and other services are located within one-fourth mile of Minnie Street. There were no changes in the immediate neighborhood between 2000

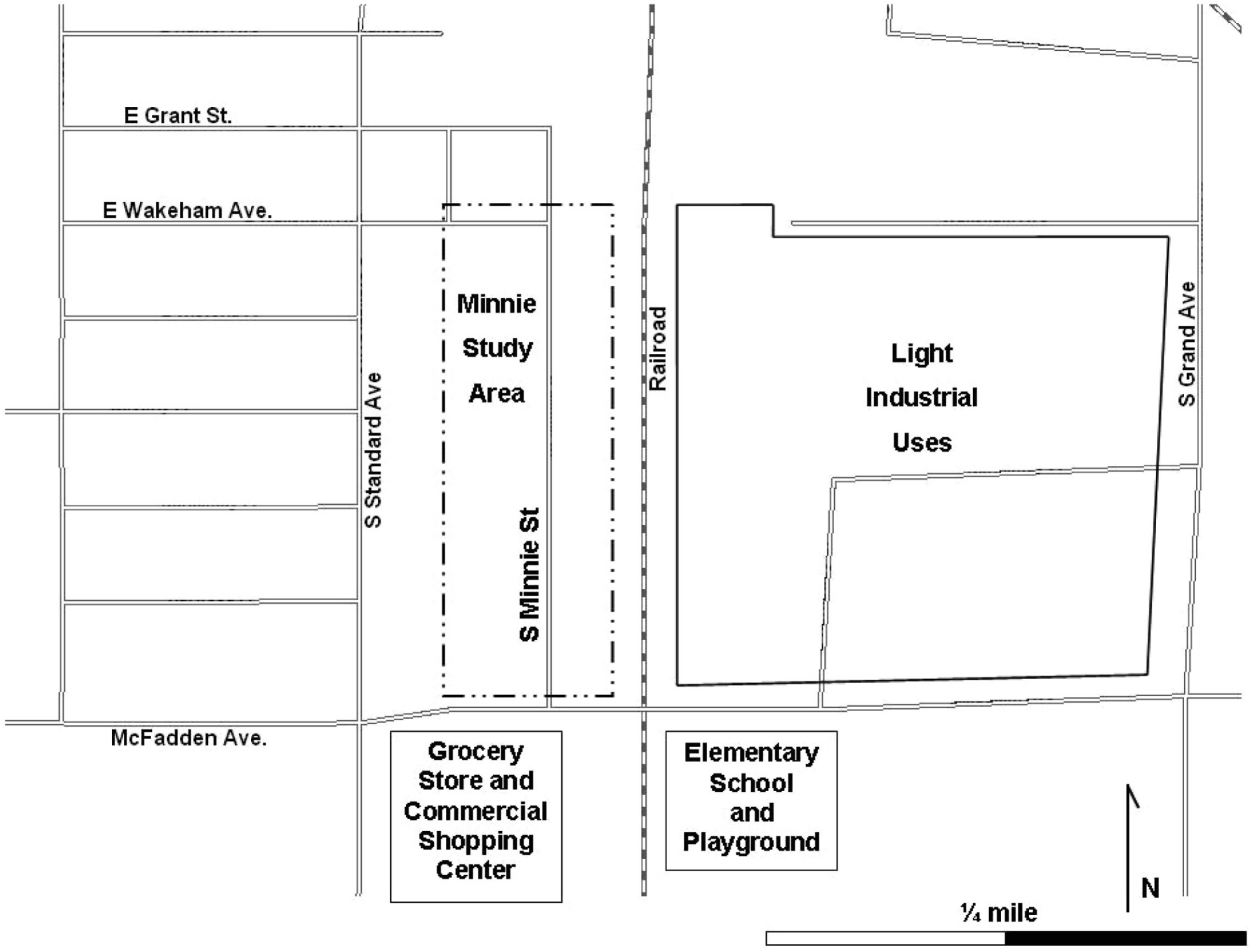

Figure 2. *Map of Minnie Street.*

and 2005, with the exception of one apartment building on nearby Standard Avenue, which was torn down.[3]

In 2000, Minnie Street residents were mostly low income, with a median household income of $24,348 (Demographics Now 2006). Minnie Street residents were mostly Latino (76 percent) and Cambodian (24 percent) according to the City of Santa Ana (2003). The study area includes primarily Latino residents. Most Cambodian residents live outside the study area on the northern edge of Minnie Street, which was not included in the study. Weather patterns during before and after data collection were similar, with mostly clear days and temperatures in the high seventies during both periods.[4]

Survey

Data collection procedures. Researchers conducted a survey of Minnie Street residents before and after the renovation. The research team included bilingual (Spanish and English) interviewers. For before surveys, interviewers were health *promotores* (health promoters) employed by Latino Health Access, a local, nonprofit health organization. For after surveys, interviewers were bilingual students at Santa Ana Community College.

Interviewers were trained through a two-hour classroom training session and practice interviews. For after surveys, interviewers also watched a video about the Minnie Street renovation and toured the neighborhood with a Community Development staff member.

Before and after surveys were conducted on weekday afternoons from 3:00 to 5:00 p.m. and on weekends from 1:00 to 3:00 p.m. Residents were approached by an interviewer at the residents' apartments and asked to complete a short survey about their experiences living on Minnie Street. At the start of the interview, residents were screened to ensure that they met qualifications (described below). Apartments that were contacted three times without participating were counted as refusals.

The survey was designed as a dwelling-based panel study. The same dwellings but not necessarily the same people were surveyed before and after the renovation (see Golub,

Kitamura and Long 1997). Dwelling-based panels are useful for analyzing changes in the social fabric. Because such surveys do not always include the same respondents at each time, before and after responses should be interpreted with caution. Changes in responses may reflect changes in the residents themselves rather than actual changes in attitudes.

Survey sample. Survey respondents were over age eighteen, were residents of Minnie Street for at least two months, lived in the study area (i.e., in Minnie Street apartments), and spoke either English or Spanish. Only one respondent (maximum) participated from each household. For before surveys, all odd number apartments (out of 434 apartments total) were approached, and apartment residents were asked to participate (n =163). After renovations, the study area included a total of 367 apartments.[5] For after surveys, researchers initially approached all odd number apartments. Because of higher refusal rates in the after survey, however, the sampling strategy was changed midway to include all apartments in the study area. A total of 129 respondents participated in the after survey for a participation rate of 33 percent.[6]

Table 1 describes sample characteristics. After survey respondents were significantly more likely to be women and had slightly smaller households (4.9 on average compared to 5.3), compared to respondents in the before survey. After survey respondents were also less likely to be married and were less likely to be employed outside the home. After survey respondents were slightly less likely to come from Mexico, compared to before survey respondents. There were no significant differences in educational attainment, language, or length of residence between the two samples. These characteristics suggest that significant gentrification did not occur following the renovation. In fact, a majority (almost 52 percent) of respondents in the after survey had lived on Minnie Street since before the renovation.[7]

To address the issue of nonresponse bias, we compared survey respondents to the total population on Minnie Street. Survey respondents are similar to the population of Minnie Street in terms of overall educational levels. After survey respondents have an average of 7.5 years of education. In comparison, the majority of Minnie Street residents over age twenty-five (48.5 percent in 2005) have between 1 and 8 years of education (Demographics Now 2006). After survey respondents are also similar to the overall population of Minnie Street in the percentage who work outside the home. Among after survey respondents, 50.4 percent work outside the home, compared to an estimated 48.8 percent who work outside the home for the entire Minnie Street population. Before survey respondents are somewhat more likely to work outside the home (63.8 percent) compared to the Minnie Street population (49.2 percent in 2000) (Demographics Now 2006).

Nonresponders may differ from survey respondents in meaningful ways. For example, nonresponders may be less interested in the issues addressed in the survey, including crime, pedestrian safety, and quality of life on Minnie Street. Also, some nonresponders may have specifically declined to participate in the study because of concerns over their legal status, with individuals living in households with undocumented residents being potentially less willing to complete the survey. These possible differences should be considered in interpreting the study's findings.

The survey. The survey included a total of fifty questions and took approximately fifteen minutes to complete. It was developed in English and then translated to Spanish. The interviewers asked questions and wrote residents' responses on the survey forms. Interviewers assured respondents that no personal information would be recorded with their responses, and respondents were instructed to skip any questions they wished.

Survey questions investigated traffic and crime safety, neighboring and quality of life, and demographic information. Researchers developed questions based on existing literature and in these topic areas, consulting previously developed survey instruments when such instruments existed. Questions were close ended. Answers consisted of a range of Likert scales, yes/no options, and limited choice responses. The survey was pilot tested in both English and Spanish. No reliability tests of the survey instrument were conducted.

Observation of Vehicle and Pedestrian Traffic

Researchers conducted observations of vehicle and pedestrian traffic to identify changes in actual pedestrian safety following the renovation. Fortunately, actual traffic accidents are rare events, and so information on accidents would only be useful if collected over a much longer time frame. Instead, researchers observed characteristics linked to safety, including vehicle speed, vehicle counts, and pedestrian counts.[8] Observations were conducted during four, one-hour sessions on weekday afternoons between 3:00 and 5:00 p.m. These times were selected to capture daytime activity on the street for adults and children. In this low-income neighborhood, most employed residents hold blue-collar jobs (Demographics Now 2006). They do not necessarily work traditional "nine to five" hours and may be coming and going at other times. Before and after traffic observation data were directly supervised by one of the principal investigators, who also participated in data collection. Before data were collected by staff members of the University of California, Irvine, Center for Trauma and Injury Prevention Research. After data were collected by graduate students at the University of California, Irvine.

Vehicle speed was measured using a radar gun borrowed from the Santa Ana Police Department. During each observation period, speeds were measured for twelve consecutive cars traveling between fixed locations on Minnie Street. To minimize obtrusiveness, the radar gun was aimed from a parked car. Additionally, observers counted the number of vehicles and the number of pedestrians traveling down

Table 1.
Sample characteristics of survey respondents.

Characteristic	*Before Survey*[a]	*SD*[b]	*After Survey*[a]	*SD*[b]	P[c]
Sample size	n = 163		n = 129		
Gender[e]					**.001**[d]
% female	50.3 (n = 82)		71.9 (n = 87)		
% male	49.7 (n = 81)		28.1 (n = 34)		
Residency	5.5 yrs.	4.9	6.3 yrs.	6.1	.265
% Minnie St. resident ≥ 5 yrs.	49.7		51.9		
% Minnie St. resident < 1 yr.	10.4		13.2		
Household size					
# people in household	5.3	1.4	4.9	1.9	.061
Age of residents					
Residents per apartment age 0-5	0.9	1.0	0.8	1.0	.332
Residents per apartment age 6-11	1.0	0.9	0.9	1.0	.197
Residents per apartment age 12-18	0.6	0.8	0.8	1.0	.204
Residents per apartment ≤ age 18	2.6	1.4	2.5	1.7	.471
Residents per apartment > 19	2.7	1.0	2.5	0.9	.061
Years of education	7.0	3.5	7.5	4.1	.305
Marital status					.067[d]
% Married	62.0		53.1		
% Single/divorced/separated	23.3		27.3		
% Other	14.7		19.5		
Work status					**.021**[d]
% currently employed outside the home	63.8		50.4		
% of male respondents currently working outside the home	77.8		82.4		
Languages spoken by respondent (may select more than one)					.682[d]
% Spanish only	72.4		75.2		
% English only	1.8		0.8		
% Bilingual—Spanish and English	25.2		24.0		
% Bilingual—Spanish and Other	0.6		0.0		
Country of birth					.183[d]
% Mexico	93.3		87.6		
% United States	2.5		7.0		
% Other	4.3		5.5		

a. Numbers are reported as means unless otherwise noted.
b. SD refers to standard deviations.
c. *P* values indicate significance level from independent samples *t* tests unless otherwise noted. Values of ≤ 0.05 are significant at the 95 percent confidence level, indicated in bold.
d. *P* values indicate significance level from chi-square analysis of categorical variable. Values of ≤ 0.05 are significant at the 95 percent confidence level, indicated in bold.
e. Interviewers did not mark gender on the survey for eight respondents.

Minnie Street during fifteen-minute periods. Only pedestrians on the street or sidewalk were counted. Individuals in courtyards were not counted. Observers noted gender and approximate age of all pedestrians.

Crime Data

To assess changes in reported crime before and after the renovation of Minnie Street, crime data were gathered with the help of the Santa Ana Police Department. Because of difficulties isolating crime data for the study area (only), Minnie Street crime data also include eight buildings outside the study area, to the north. These buildings also received some renovation. Annual crime data were collected for thirteen categories for the years between 1990 and 2004.[9]

To determine whether Minnie Street crime trends differed from citywide crime trends, citywide violent crime data were also collected for the years from 1990 to 2004. Citywide data include only crimes committed within the City of Santa Ana boundaries. Citywide crime data were reported in six categories according to Uniform Crime Reporting (UCR) standards. These categories were matched with equivalent crime categories on Minnie Street, and UCR categories were used for analysis.[10]

Data on property crime on Minnie Street are not comparable to the citywide property crime data. (Minnie Street data

did not include arson or burglary-vehicle, both of which were included in citywide, property crime data.) Because of this incomparability, data on property crimes are reported for Minnie Street only; no citywide comparisons are presented.

Data Analysis

All data were entered into Microsoft Excel and cleaned. Data were analyzed using SPSS statistical software. Survey and observational data were analyzed using chi-square tests for independence and independent samples *t* tests. Our focus was on specific changes. We did not combine items into scales. The continuous variables had unimodal distributions so that their means were normally distributed. We examined the Levene's test for equality of variances and used the *t* test for unequal variances when equality of variances was rejected. A one-tailed significance test was used for analysis of traffic speeds, reflecting the directional hypothesis that the renovation would slow rather than speed traffic on Minnie Street.

Because of the small number of (annual) data points following revitalization, no statistical comparisons of crime data were attempted. Instead, crime data were depicted graphically to identify trends over time. Crime rates were calculated per capita, using 2000 U.S. Census population figures.[11] Crime data from 2000 and 2001 were eliminated, since these were the time periods during which the renovation occurred. Consistent with UCR practices, aggravated assault, robbery, rape and attempted rape, and homicide were classified as "violent crime."

▶ Results

Perceived Pedestrian Safety

Survey findings. The renovation was associated with a significant increase in the perceived safety of children (Table 2). Respondents perceived sidewalks on Minnie Street ($P < .001$); the street itself ($P < .001$); building courtyards ($P < .001$); and parking lots near railroad tracks ($P = .007$) as safer after the renovation, compared to before. Agreement with the statement, "Parked vehicles on Minnie Street make it difficult for drivers to see children near the street," also decreased in after surveys, compared to before surveys ($P = .001$).

Perceived pedestrian safety from traffic was also higher in after responses, compared to before. Survey responses characterized midblock crossing on Minnie Street as significantly safer after the renovation, compared to before. Crossing in the early morning ($P < .001$); early afternoon ($P < .001$); and on the weekends ($P < .001$) were all considered safer. Perceptions of safety from street traffic on Minnie Street were higher after the renovation ($P = .042$). Also, agreement with the statement, "There are too many cars and trucks driving down the street," decreased in after surveys ($P = .043$), compared to before surveys. Agreement with the statement, "Cars and trucks go too fast down Minnie Street," decreased as well ($P = .002$).

Actual Pedestrian Safety

Observation of pedestrian and vehicle traffic, findings. Vehicle speeds decreased significantly from before to after observations, declining from a mean vehicle speed of almost nineteen miles per hour in before observations to a mean vehicle speed of almost seventeen miles per hour in after observations ($P = .039$); see Table 3. This drop was statistically significant. Median and mode vehicle speed also decreased (eighteen to sixteen miles per hour for median speeds and seventeen to fifteen miles per hour for mode speeds).

Vehicle counts decreased significantly from before to after observations. During before observations, an average of over forty-eight vehicles were observed traveling on Minnie Street during each fifteen-minute observation period. In after observations, that number declined to an average of approximately thirty vehicles per observation period ($P = .011$).

Street crossings at intersections (linked to pedestrian safety) increased significantly from an average of 1.5 crossings per before observation period to almost 5 crossings after ($P = .026$). There was no significant difference in the number of observed midblock crossings.

Perceived Crime Safety

Survey findings. Contrary to expectations, results showed decreased perceptions of safety from crime on Minnie Street in survey responses after the renovation. The perception of Minnie Street as safe from crime was lower in after surveys, although this finding was not statistically significant ($P = .056$). Gender differences in attitudes toward crime were examined because of the large increase in the number of women participants in the after survey (compared to before). Women perceived Minnie Street as significantly less safe from crime after the renovation, compared to before ($P = .008$); see Table 4. This finding was not statistically significant for men (Table 3). Women's perceptions of gangs as a problem were also significantly higher after the renovation ($P = .022$). Men's perceptions of gangs as a problem did not increase.

Actual Crime Safety

Crime data findings. Violent crime rates on Minnie Street peaked and then dropped dramatically in 1996 (Figure 3). This trend compares with a steady decrease in citywide violent crime rates in Santa Ana between 1994 and 1998. Per

Table 2.
Findings from survey of residents before and after the Minnie Street renovation.

Question	*Men and Women Before*[a]	*Men and Women After*[a]	t	df[b]	P[c]
Sample size	n=163	n=129			
Perceived Pedestrian Safety for Children (1 = *very dangerous*; 10 = *very safe*)					
Sidewalks on Minnie St.	3.95 ± 2.58	5.09 ± 2.91	–3.57	290	**.000**
Minnie St. itself	4.10 ± 3.27	6.63 ± 3.04	–6.77	290	**.000**
Building courtyards	4.71 ± 3.01	6.26 ± 2.96	–4.38	290	**.000**
Parking lots near railroad tracks	3.94 ± 3.81	5.01 ± 2.93	–2.70	287	**.007**
Parking lots between apartments and Standard Ave.	4.71 ± 3.52	4.82 ± 2.73	–0.29	287	.774
"Parked vehicles on Minnie St. make it difficult for drivers to see children near the street" (1 = *strongly disagree*; 10 = *strongly agree*)	7.83 ± 2.78	6.66 ± 3.06	3.41	287	**.001**
"The building courtyards are a good place for small children to play" (1 = *strongly disagree*; 10 = *strongly agree*)	4.75 ± 2.98	6.55 ± 2.89	–5.18	289	**.000**
"Making traffic go slower down Minnie St. will make it safer for children" (1 = *strongly disagree*; 10 = *strongly agree*)	8.50 ± 2.42	8.30 ± 2.11	0.72	290	.471
Perceived Pedestrian Safety-General (1 = *very dangerous*; 10 = *very safe*)					
Safety from street traffic	3.63 ± 2.36	4.22 ± 2.57	–2.05	290	**.042**
Traffic Speed and Volume (1 = *strongly disagree*; 10 = *strongly agree*)					
"Cars and trucks go too fast down Minnie St."	7.70 ± 2.67	6.66 ± 2.90	3.18	290	**.002**
"Too many cars and trucks drive down Minnie St."	7.80 ± 2.58	7.20 ± 2.43	2.03	290	**.043**
Crossing Minnie St.(1 = *very unsafe*; 10 = *very safe*)					
Early morning between 6:00 and 9:00 a.m.	5.29 ± 3.12	6.72 ± 2.70	–4.11	290	**.000**
Early afternoon between 12:00 and 3:00 p.m.	4.55 ± 3.00	6.09 ± 2.83	–4.49	290	**.000**
Evening between 5:00 and 8:00 p.m.	4.26 ± 3.07	4.73 ± 2.92	–1.31	290	.191
Anytime on the weekends	3.83 ± 2.75	5.12 + 3.00	–3.82	290	**.000**
Perceived Crime Safety (1 = *very dangerous*; 10 = *very safe*)					
Safety from gang-related activities	4.03 ± 2.57	3.20 ± 2.49	2.79	289	**.006**
Safety from crime	4.12 ± 2.80	3.50 ± 2.66	1.92	290	.056
"Gangs are a problem on Minnie St." (1 = *strongly disagree*; 10 = *strongly agree*)	6.48 ± 3.12	7.01 ± 3.18	–1.43	290	.154
Walking, spending time on Minnie Street (1 = *2 or more times/day*; 2 = *once a day*; 3 = *at least once a week*; 4 = *hardly ever*; 5 = *never*)					
"On average, how often do you spend time outside talking with your friends and neighbors?"	2.64 ± 1.86	3.43 ± 1.24	–4.37	282.01	**.000**
"On average, how often do you go to the [grocery] vendors on Minnie St.?"	2.50 ± 1.40	2.59 ± 1.28	–0.55	284.23	.585
"On average, how often do you walk to the grocery store?"	1.78 ± 1.12	2.54 ± 1.01	–5.99	290	**.000**
"I like walking on Minnie St." (1 = *strongly disagree*; 10 = *strongly agree*)	4.82 ± 2.94	6.67 ± 2.88	–5.38	290	**.000**
Neighboring (1 = *all*; 2 = *most*; 3 = *a few*; 4 = *none*)					
"How many people know in your building?"	2.19 ± 0.97	2.16 ± 0.96	0.24	290	.809
"How many people know in adjacent buildings?"	3.01 ± 1.07	2.58 ± 0.97	3.50	289	**.001**
"How many people know in buildings across the street?"	3.44 ± 0.89	3.49 ± 0.66	–0.58	289.02	.562
% residents that know manager of apt. building	90.8	87.5	0.819	1	.365[d]
% residents that feel they can talk with manager of apt. building	74.7	82.2	2.34	1	.126[d]
"How often do you go to meetings that discuss neighborhood issues and concerns?" (1 = *at least once a week*; 2 = *2 to 3 times per month*; 3 = *once a month*; 4 = *a few times a year*; 5 = *never*)	3.03 ± 1.34	4.57 ± 0.82	–12.06	273.72	**.000**

(continued)

Table 2. (continued)

Question	*Men and Women Before*[a]	*Men and Women After*[a]	t	df[b]	P[c]
Quality of life on Minnie St.(1 = *very bad*; 10 = *excellent*)					
Availability of parking	4.33 ± 3.14	3.99 ± 2.93	0.94	289	.348
Appearance of buildings	4.05 ± 2.72	7.51 ± 2.28	–11.80	287.85	**.000**
Appearance of Minnie St., in general	3.63 ± 2.55	7.45 ± 2.15	–13.82	287.43	**.000**
Condition of courtyards	3.63 ± 2.42	6.57 ± 2.83	–9.33	247.98	**.000**
Overall rating of Minnie St.	4.81 ± 2.66	6.67 ± 2.31	–6.27	290	**.000**
"How proud are you about living on Minnie St.?" (1 = *not proud at all*; 10 = *very proud*)	4.65 ± 3.19	5.91 ± 2.76	–3.63	287.82	**.000**
"The inside of my home is in need of repair" (1 = *strongly disagree*; 10 = *strongly agree*)	6.93 ± 3.31	5.29 ± 3.41	4.13	290	**.000**
"Minnie St. is a pleasant place to live." (1 = *strongly disagree*; 10 = *strongly agree*)	4.77 ± 2.93	6.55 ± 2.86	–5.22	289	**.000**

a. Numbers are reported as means +/– one standard deviation unless otherwise noted.
b. Where *df* (degrees of freedom) include decimals, this is because of a failed Levene's test for homogeneity of variance and a subsequent *df* adjustment. Also, reported *df* may be less than 290 when respondents opted not to answer specific questions.
c. *P* values indicate significance level from independent samples *t* tests unless otherwise noted. Values of ≤0.05 are significant at the 95 percent confidence level, indicated in bold.
d. *P* values indicate significance level from chi-square analysis of categorical variable. Values of ≤0.05 are significant at the 95 percent confidence level, indicated in bold.

Table 3.
Findings on pedestrian and vehicle traffic before and after Minnie Street renovation.

	Before Observations[a]	*SD*[b]	*After Observations*[a]	*SD*[b]	t	df	P[c]
Mean vehicle speed[d]	18.92 mph	4.67	16.86 mph	5.09	1.79	70	**.039**
Mean vehicle count	48.33	10.63	30.33	9.29	3.12	10	**.011**
Mean pedestrian count	82.00	11.54	52.87	14.76	4.00	12	**.002**
Mean #, age 9 and under	25.67	8.80	9.62	6.02	4.06	12	**.002**
Mean #, age 10 to 15	13.67	5.82	5.00	2.78	3.72	12	**.003**
Mean #, age 15 and up	42.67	13.35	38.25	13.00	0.62	12	.546
Mean # bicyclists	3.17	2.32	3.57	1.72	–0.36	11	.725
Mean # crossing at intersection	1.50	2.35	4.75	2.38	–2.55	12	**.026**
Mean # crossing mid-block	11.17	9.37	4.75	2.38	1.64	5.49[e]	.157
% mid-block crossings, as a percentage of total # of pedestrians	13.62		8.98				
Mean # of pedestrians walking or playing in the street or gutter	3.33	4.50	2.00	2.00	0.71	11	.492

a. Numbers are reported as means, unless otherwise noted.
b. SD refers to standard deviations.
c. *P* values indicate significance level from independent samples *t* tests. Values of ≤0.05 are significant at the 95 percent confidence level, indicated in bold.
d. A one-tailed significance test was conducted.
e. *df* (degrees of freedom) is divergent because of an adjustment after the failing the Levene's test for homogeneity of variance.

capita violent crime rates on Minnie Street were comparable to per capita crime rates citywide throughout this period, except in 1995 and 1996. (Violent crime in the city of Santa Ana began to decline gradually in 1994, while violent crime on Minnie Street remained high until 1996 and then dropped dramatically.) Violent crime rates in Santa Ana and on Minnie Street remained low after 1997.

Property crime on Minnie Street saw a slight decline beginning in 1996 and continuing more or less regularly through 2004 (Figure 4).

Table 4.
Perceptions of crime safety before and after the Minnie Street renovation, women respondents only.

Question	*Women Before*[a]	*Women After*[a]	t	df	P[c]
Sample size	n = 82	n = 87			
Perceived crime safety					
Safety from gang-related activities (1 = *very dangerous*; 10 = *very safe*)	4.22 ± 2.55	2.74 ± 2.20	4.02	166[b]	**.000**
Safety from crime (1 = *very dangerous*; 10 = *very safe*)	4.22 ± 2.77	3.16 ± 2.39	2.67	167	**.008**
"Gangs are a problem on Minnie St." (1 = *strongly disagree*; 10 = *strongly agree*)	6.33 ± 3.02	7.41 ± 3.09	–2.31	167	**.022**

a. Numbers are reported as means unless otherwise noted.
b. *df* (degrees of freedom) is less than 167 because one respondent did not answer the question.
c. *P* values indicate significance level from independent samples *t* tests. Values of ≤ 0.05 are significant at the 95 percent confidence level, indicated in bold.

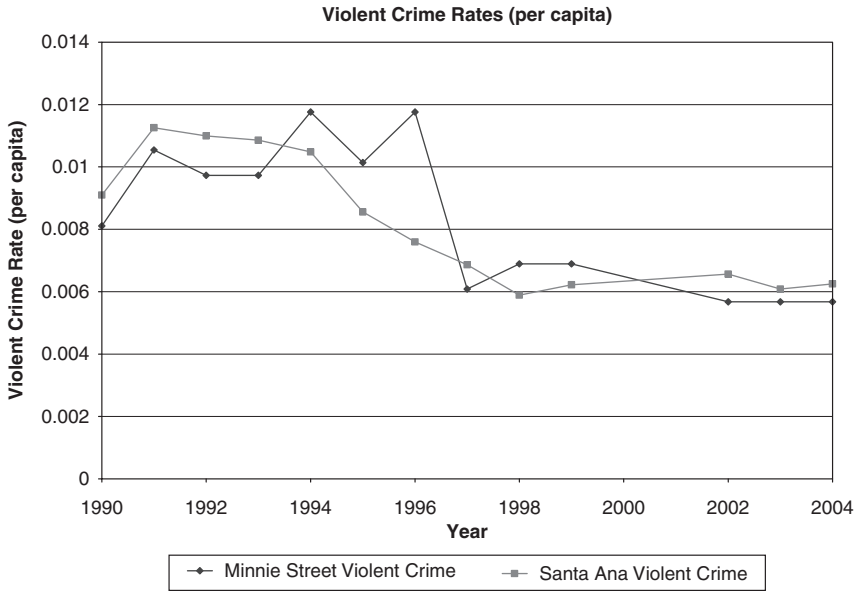

Figure 3. *Per capita violent crime on Minnie Street and in Santa Ana from 1990 to 2004.*

Walking

Survey findings. Respondents in after surveys reported that they spent significantly more time outside talking with friends and neighbors ($P < .001$). They also reported that they walked to the grocery store more often ($P < .001$), compared to respondents in before surveys. After survey respondents were more likely to agree with the statement, "I like walking on Minnie Street" ($P < .001$).

Observation of pedestrian and vehicle traffic, findings. Unexpectedly, the number of pedestrians on Minnie Street declined in observations after the renovation. In before observations, there were an average of eighty-two pedestrians per fifteen-minute observation period, compared to an average of almost fifty-three pedestrians per after observation period. This decrease was statistically significant ($P = .002$). The change was especially dramatic regarding the number of observed children, which declined from an average of nearly twenty-six per observation period in before observations, to an average of almost ten children per observation period in after observations ($P = .002$). The number of observed pedestrians between the ages of ten and fifteen also declined significantly, from an average of over thirteen per fifteen-minute observation before to five after ($P = .003$). As noted earlier, these counts do not include the number of pedestrians in courtyards.

Perceived Quality of Life and Neighboring

Survey findings. Residents felt more positive about their neighborhood in responses to after surveys, compared to before. After responses report significantly more positive evaluations of the appearance of buildings on Minnie Street ($P < .001$), the appearance of Minnie Street in general ($P < .001$), and the condition of building courtyards ($P < .001$), compared to responses in before surveys. Agreement with the statement, "The inside of my home is in need of repair," was significantly lower after the renovation, compared to before ($P < .001$). Perceptions of Minnie Street as a pleasant place to live were also higher in after surveys ($P < .001$), as was pride about living on Minnie Street ($P < .001$).

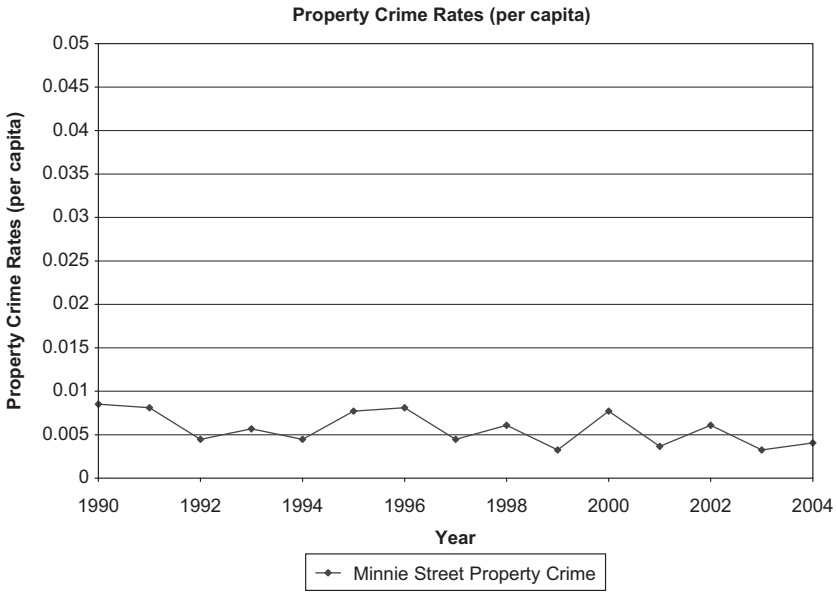

Figure 4. *Per capita property crime on Minnie Street, from 1990 to 2004.*

Survey questions also explored neighboring on Minnie Street. Respondents reported that they knew significantly more people in adjacent buildings in after surveys, compared to before ($P = .001$). There was no significant increase in residents' reports of the number of people they knew in their own buildings or across the street. After surveys did not reveal significant differences in the percentage of residents who knew their building manager or in the percentage of respondents who felt they could talk with the building manager. Respondents attended significantly more meetings about neighborhood issues, as reported in after surveys ($P < .001$), compared to before surveys. This difference reflects an increase in reported attendance at neighborhood meetings from an average of a few times a year to monthly.

▶ Discussion

Perceived and Actual Pedestrian Safety

The renovation of Minnie Street is clearly associated with perceived improvements in pedestrian safety for children, the primary population targeted by traffic safety improvements. These include perceptions of improved safety in several different public spaces. For example, conditions associated with child pedestrian injury in previous research (Roberts et al. 1994; Schofer et al. 1995; Stevenson et al. 1992), such as presence and proportion of the curb containing parked vehicles, were improved on Minnie Street, leading to a reduction in the perception that parked cars may make children difficult to see from the street. This is an important finding, given the large number of children on Minnie Street and the serious concerns about children's safety prior to the renovation.

The renovation is also associated with a general sense of improved pedestrian safety for most times of the day and most days of the week. Perception of traffic safety is as important as actual traffic conditions in influencing travel behavior. Previous research shows that negative perceptions of traffic safety are associated with negative outcomes, including reduced probability of walking and bicycling to school in children (McMillan forthcoming).

These perceptions of improved pedestrian safety make sense, since actual traffic safety on Minnie Street improved following the renovation. The change in the number of vehicles on the street declined by roughly 37 percent. Reducing vehicular volumes in this way may decrease the frequency of auto-pedestrian conflicts. The drop in the number of vehicles is especially impressive, considering that vehicle ownership among Minnie Street residents increased between 2000 and 2005 (from an average of .8 vehicles per household in 2000 to an estimated average of 1.2 vehicles per household in 2005; Demographics Now 2006). The drop in vehicle count may be due mostly to changing vehicle travel to one way. The number of vehicles on Minnie Street after converting the street to one way (northbound only) was roughly equivalent to the number of northbound vehicles before the renovation (31.5 northbound vehicles before, compared to 30.33 northbound vehicles after.) As discussed earlier, one-way streets simplify the street environment for the pedestrian, increasing the ability to predict vehicle behavior and cross safely.[12]

Other factors may have also helped to explain the drop in traffic volume, including changes to the built environment to slow traffic (meandering "chicane," angle parking, street trees) and those that make the neighborhood look defended and less inviting to through traffic (entry markers, consistent and attractive building design and streetscape). The number of vehicles traveling on Minnie Street—30 per fifteen-minute period—remains high, considering that Minnie Street is a residential street.

Traffic speed on Minnie Street also declined. As noted earlier, traffic speed is associated with the likelihood and severity of pedestrian accidents. Overall traffic speeds on the street

were not high, at nineteen miles per hour before the renovation and seventeen miles per hour afterwards. The drop—at approximately two miles per hour—is small but significant, given the low average speeds overall.

Thus, the renovation appears to have succeeded in improving conditions associated with actual pedestrian safety. The results are especially important for children, as reductions in vehicle speeds and volumes and improvements in sight lines better match the residential street environment with children's pedestrian developmental learning (Whitebread and Neilson 2000). These conditions also enhance the environment for all pedestrians, young and old.

Perceived and Actual Crime Safety

The renovation appears to have had less impact on actual and perceived crime safety. Minnie Street experienced a reduction in violent crime during the time between 1994 and 2004. This reduction follows a drop after 1996, the same year that the police substation opened on Minnie Street. The drop in violent crime on Minnie Street after 1996 is consistent with a citywide reduction in violent crime between 1994 and 1998. There is a slight reduction in violent crime on Minnie Street since the renovation was completed (approximately 2001). No drop in property crime can be specifically attributed to the renovation.

It is difficult to be conclusive about trends in crime on Minnie Street, since only three years of crime data are available since the renovation in 2001. What is perhaps noteworthy is that there does not appear to be a rise in violent crime on Minnie Street in recent years, although police are no longer regularly stationed at the Minnie Street substation. According to informal conversations with Santa Ana police, reduced police presence at the Minnie Street substation reflects the reality of limited resources. Minnie Street is no longer a top priority area for police, given reductions in crime and problems in the neighborhood. Also, extra police for the Minnie Street substation were funded by a grant that has since expired. Thus, it is possible that the renovation of Minnie Street may have contributed to the neighborhood's sustained reduction in violent crime, despite declining police presence.

Surprisingly, the renovation was not associated with increases in perceived safety from crime. In fact, for women, crime safety is actually more of a concern after the renovation, compared to before. The finding of increased fear among women is hard to explain. One possible explanation could be differences in the survey respondents between the before and after survey in terms of characteristics such as educational level or marital status, which are associated with fear among women (Gordon and Riger 1989.) Yet data do not reveal significant differences in education or in martial status in the direction that would be associated with higher fear. Likewise, changes in neighborhood population—and specifically an increase in the number of teens—might help to example higher fear levels after the renovation. The percentage of teens on Minnie Street did not increase between 2000 and 2005, however (Demographics Now 2006).

Other possible explanations for the decline in perceived safety, specifically among women respondents, are more speculative. During after surveys, many residents registered concern about the declining police presence in the neighborhood. Residents' expectations for police presence may have increased during the time that the police station was actively staffed. Perceptions of reduced safety after the renovation could then reflect residents' concern about declining police presence. It is also possible that expectations for increased crime safety were raised by the renovation and that the resulting changes to the neighborhood, while positive, did not meet initial expectations in terms of decreased crime. It is not clear why higher expectations would pertain to women respondents only, however.

In informal interviews with Santa Ana police about this finding, police suggested that a new generation of gang members is now active in the city, which could explain respondents' higher fear levels after the renovation. Crime data do not support these police perceptions, however. Also, police insist that the general crime situation on Minnie Street is indeed dramatically better today than before the renovation.

Finally, it may be that the before survey captured a unique period of high resident mobilization. Such high levels of neighborhood organization at the time of before surveys might have been associated with uncharacteristically reduced levels of fear at that time (Skogan 1986). Survey results do not speak to these possible explanations directly.[13]

Walking in the Minnie Street Neighborhood

Increasing walking on Minnie Street was not a specific objective of the renovation. Nevertheless, it is reasonable to expect that the renovation might have increased walking on the street, since the intervention was designed to improve pedestrian and crime safety, which are linked to walking for exercise and travel (see, for example, Centers for Disease Control and Prevention 1999; U.S. Department of Transportation 1994). Indeed, survey respondents reported that they walked to the grocery store more often and that they enjoyed walking on Minnie Street more following the renovation. Thus, the dramatic drop in the number of observed pedestrians after the renovation, including fewer children and teens, was unexpected.

This drop could possibly be because of a reduction in the number of residents living on Minnie Street. As part of the renovation, building owners agreed to limit the number of persons per household for new residents (to five persons per one-bedroom apartment.) Continuing residents were not

affected by this policy, however, and roughly half of after survey respondents had lived on Minnie Street since prior to the renovation. The number of individuals per household did decline slightly between respondents of before and after surveys, but this difference was not statistically significant. Also, census data suggest an increase in Minnie Street's population from a total of 3,933 in 2000 to an estimated total of 4,173 in 2005 (Demographics Now 2006).

At the same time, fewer respondents reported working outside the home in the after survey, compared to the before survey (64 percent worked outside the home before, versus 50 percent after). This change could mean a reduction in the number of individuals walking to work. Alternately, this reduction could indicate an increase in the number of individuals who might walk on the street for other nonwork purposes. These possible impacts cannot be determined from the findings.

The presence of fewer children on the street may reflect changes in other opportunities and activities for neighborhood children. When queried, the principal at the local elementary school reported no change in enrollment boundaries or in after-school programs between 2000 and 2005. The school did, however, change from a year-round school calendar in 2000 to a more traditional calendar in 2002. It is possible that the greater number of children and youth observed in 2000 may have been associated with a break in the year-round school calendar during some before observations. If so, this could have increased the number of students who would not be participating in after-school activities at that time (and could therefore be observed on the street).

We also investigated changes in the number of children served by the learning center on Minnie Street during after-school hours (the time of pedestrian observations). According to learning center staff, approximately 200 children and teens were served by the learning center in 2000, compared to 380 children, teens, and adults served in 2005. These numbers represent those individuals served during the entire year; not all individuals participate at all times. Nevertheless, an increase in individuals participating in indoor activities at the learning center may at least partly explain the decreased number of pedestrians observed after the renovation.

Another, albeit speculative, explanation for the drop in the number of observed pedestrians is that the renovation improved the appearance and livability of apartments and building courtyards. It is possible that individuals spent more time in courtyards or in apartments following the renovation. Our data did not allow us to examine this question more directly.

The question of impacts on walking is important, given the extensive interest in the relationship between the built environment and physical activity among planners and planning researchers (see, for example, the 2006 special issue of the *Journal of the American Planning Association* on planning and health). The "active living" agenda focuses on how modifications to the built environment might increase walking for recreation and travel to enhance physical activity and combat obesity (Active Living Research, 2004), especially in low-income communities and communities of color (Day 2006; U.S. Department of Health and Human Services 1996.) The findings of this study suggest that the relationship between built environment changes and walking is not direct and that other factors may also intervene to influence this relationship.

▶ Quality of Life and Neighboring

The renovation was clearly associated with more positive assessments about the appearance of the neighborhood and of individual apartments. These findings are not surprising, given the dramatic improvements to the neighborhood environment during the renovation. The impact on neighboring is more limited but still positive, including knowing more people in adjacent buildings, attending more neighborhood meetings, and spending more time talking to friends on the street. These findings confirm the beneficial impacts of the renovation.

▶ Conclusions

Planners and designers have long been intrigued by the possibility of modifying the built environment as a strategy to ameliorate crime and improve safety in poor, urban communities. Yet even in the case of comprehensive, attractive neighborhood renovation, urban design may be a necessary but insufficient part of the solution. One interpretation of the findings from this study is that pedestrian safety may be relatively easier to impact through built environment changes compared to crime and fear of crime. Findings also suggest that we must carefully consider the multiple needs of poor communities to determine objectives and to evaluate change. So, for example, a goal of increasing walking and outdoor play may actually conflict with a goal of increasing participation in after-school programs. The best solutions may address multiple goals at once and will offer flexibility to address individual and community needs.

The question arises as to whether the positive impacts associated with the Minnie Street renovation—including reduced travel speeds, higher rates of perceived pedestrian safety, and increased quality of life—can be sustained. To the extent that these impacts are associated with permanent changes to the built environment (as in the case of the one-way street conversion), the answer would seem to be yes. Furthermore, if the renovation process and outcomes also increased residents' involvement in their community, then these impacts may also be long lasting. The participatory mechanisms that were implemented as part of the renovation (owners' association, tenants' association, etc.) should help in this regard.

► Notes

1. Concern about pedestrian safety on Minnie Street mirrored a broader concern throughout the City of Santa Ana. In the late 1990s, Santa Ana was identified as having one of the highest pedestrian death rates in the state of California. (Calculations are based on data from the California Highway Patrol Statewide Integrated Traffic Records Systems and the California Department of Finance Populations Projections.) Over half of the traffic fatalities in the city were pedestrians. Through a state-funded grant, a pedestrian safety task force was established in 1999 to address this issue. Local schools, city agencies, and community groups undertook various pedestrian safety activities.

2. As part of the Minnie Street renovation, an owners association was formed, and owners adopted covenants, conditions, and restrictions and owner participation agreements. Owners also agreed to hire on-site managers to screen tenants and restrict uses, to bring apartments up to code, and to maintain their properties (City of Santa Ana 2002). Apartment managers completed a training program, and a managers' association was formed. A tenant association was also formed so that tenants could engage the city and the owners during the renovation process.

3. This site has remained a vacant lot surrounded by a fence.

4. On days when "before" observations were conducted, the average (mean) temperature was seventy-seven degrees (with a range from seventy-two to eighty degrees). On days of "after" observations, the average (mean) temperature was seventy-nine degrees (with a range of seventy-four to eighty-six degrees). Data collection did not take place on days with rain.

5. The number of apartments was reduced, since some one-bedroom apartments were converted to two- or three-bedroom units.

6. The greater familiarity of the *promotores* (health promoters) with the neighborhood and the promotores' greater experience in approaching residents in their homes may partly explain the higher response rate in before surveys.

7. This fact does not mean that 52 percent of after survey respondents participated in the before survey but rather that 52 percent of after respondents lived on Minnie Street for five years or more, which would include the time period during which the before survey was completed.

8. Counts of parked vehicles were also collected, but these counts were not analyzed, since the number of parked cars consistently equaled the number of on-street parking spaces.

9. Crime categories include malicious mischief, petty theft, grand theft, burglary—commercial, burglary—residential, rape and attempted rape, shooting at an occupied dwelling, assault with a deadly weapon, robbery—person, robbery—residential, robbery—commercial, kidnap and attempted kidnap, and homicide.

10. Uniform Crime Reporting (UCR) crime categories include homicide, robbery, aggravated assault, rape and attempted rape, burglary, and larceny. The UCR category of robbery includes robbery—commercial, robbery—person, and robbery—residential. The UCR category of larceny includes the sum of grand theft and petty theft. The UCR category of assault with a deadly weapon is equivalent to aggravated assault, as reported for Minnie Street. The category of burglary was eliminated from the analysis, since this was not equivalent between citywide and Minnie Street data (citywide data included data on burglaries from vehicles, while Minnie Street data did not.)

11. Crime data were also calculated per household. Findings at the household level are similar to those per capita. Only the latter are reported here.

12. Under some conditions, one-way streets may compromise safety for pedestrians by increasing pedestrian-vehicular conflicts because of increased and complex vehicle turning and unexpected directions of movement.

13. In interpreting this finding, it is important to recall that respondents were not asked to directly compare safety before and after the renovation. Rather, the survey asked respondents to describe their levels of fear using Likert scales both before and after the renovation.

Authors' Note: *We thank sincerely the numerous individuals who assisted with this study, including: Ana Aguayo, Gerry Balcazar, Gerardo Barriga, Victor Becerra, Carol Berg, Sergeant Kevin Brown, Araceli Esparza, Cynthia Galvan, Sergeant Kenneth Gominsky, Rebecca Gorton, Herlinda Guzman, Laura Heng, Oscar Iglesias, Scott Kutner, Julia Lavinsky, Ray Lirette, Lyn Long, Sara Lundquist, Noemi Maldonado, Achilles Malisos, Janet Mateo, Sergeant Steve Monsanto, Alison Nelson, Oscar Novello, Alyssa Ortega, Maria Perez, Soledad Rodriguez, Nandini Sankar, Sarah Servin, H. Erin Smith, Lilia Tanakeyowma, Alex Vasquez, Fausto Villalobos, Chief Paul Walters, Desyl Wood, Maria Yanez, and Victoria Zaragoza. Funding for this study was provided by Active Living Research, a national program of the Robert Wood Johnson Foundation, and by the California Office of Traffic Safety.*

► References

Active Living by Design. 2004. *About active living by design.* http://www.activelivingbydesign.org/index.php?id=219 (accessed on February 19, 2004).

Active Living Research. 2004. *What is active living?* http://www.activelivingresearch.org/index.php/What_is_Active_Living/103 (accessed on February 19, 2004).

Anderson, R. W. G., A. J. McLean, M. J. B. Farmer, B. H. Lee, and G. B. Brooks. 1997. Vehicle travel speeds and the incidence of fatal pedestrian crashes. *Accident Analysis and Prevention* 29: 667-74.

Appleyard, D. 1980. *Livable streets, protected neighborhoods.* Berkeley: University of California Press.

Atkins, S. 1989. Critical paths: Designing for secure travel. London: Design Council.

Brantingham P.L., and P. J. Brantingham. 1993. Nodes, paths, and edges: Considerations on the complexity of crime and physical environment. *Journal of Environmental Psychology* 13: 3-28.

Bureau of Justice Statistics. 2002. Sourcebook of criminal justice statistics online. 30th ed. Section 2: Public attitudes toward crime and criminal justice-related topics. http://www.albany.edu/sourcebook/pdf/section2.pdf (accessed on June 1, 2005).

Centers for Disease Control and Prevention. 1999. Neighborhood safety and prevalence of physical inactivity in selected states, 1996. *Morbidity and Mortality Weekly Report* (48) 143-6.

City of Santa Ana. 2002. Cornerstone summaries and updates, Wakeham Grant apartments. Unpublished memo. City of Santa Ana, California.

———. 2003. Cornerstone Village improvement plan update for the mayor. Unpublished memo. City of Santa Ana, California.

———. 2004a. Cornerstone Village. A partnership between the City of Santa Ana, residents and the property owners of Minnie Street. Flyer, available from Community Development Agency, City of Santa Ana, California.

———. 2004b. Cornerstone Village: A new beginning. Video, available from Community Development Agency, City of Santa Ana, California.

City of Santa Ana Police Department. 2005. Minnie/Standard Street detail. http://www.ci.santa-ana.ca.us/pd/minniestreet.htm (accessed on October 3, 2005).

Day, K. 1999. Embassies and sanctuaries: Race and women's fear and welcome in privatized public space. *Environment and Planning D: Society and Space*. 17 (3), 307-28.

———. 2000. Strangers in the night? Women's fear of sexual assault on urban college campuses. *Journal of Architectural and Planning Research*, 16 (4): 289-312.

———. 2003. New Urbanism and the challenges of designing for diversity. *Journal of Planning Education and Research* 23 (1): 83-95.

———. 2006. Active living and social justice: Planning for physical activity in low-income black and Latino communities. *Journal of the American Planning Association* 72 (1): 88-99.

Demographics Now. 2006. Data on block groups 060590745012, 060590745013 (Minnie Street north of McFadden Avenue). www.demographicsnow.com (accessed on May 6, 2006).

Eck, J., and D. Weisburd, eds. 1995. *Crime and place*. Monsey, NY: Willow Tree Press.

Evenson, K. R., O. L. Sarmniento, M. L. Macon, K. W. Tawney, and A. S. Ammerman. 2002. Environmental, policy, and cultural factors related to physical activity among Latina immigrants. *Women and Health* 36 (2): 43-57.

Golub, T. F., R. Kitamura, and L. Long. 1997. *Panels for transportation planning: Methods and applications*. Dordrecht, Netherlands: Kluwer Academic Publishers.

Gordon, M. T., and S. Riger. 1989. *The female fear*. New York: Free Press.

Gorton, R., J. Lavinsky, L. Long, A. Malisos, A. Nelson, M. Powe, N. Sarkar, E. Smith, and D. Wood. 2005. Evaluation of the Cornerstone Village Improvement Project. Unpublished report, Department of Planning, Policy, and Design, Univ. of California, Irvine.

Hicks, J. 2001. Minnie Street headed in new direction. *Los Angeles Times*, January 11. http://www.latimes.com/cgi-bin/print.cgi (accessed on January 11, 2001).

Insurance Institute for Highway Safety. 2005. Fatality facts 2003: Pedestrians. http://www.highwaysafety.org/safety_facts/fatality_facts/pdfs/pedestrians.pdf (accessed on March 10, 2005).

Jacobs, J. 1961. The death and life of great American cities. New York: Vintage.

Jacobsen, P., C. L. Anderson, D. G. Winn, J. Moffat, P. F. Agran, and S. Sarkar. 2000. Child pedestrian injuries on residential streets: Implications for traffic engineering. ITE Journal on the Web (February): 71-74. http://www.issinet.com/bin/webdbc.dll/traffic/users/htx/&/ite/journal/results.htx (accessed on January 30, 2007).

Jeffrey, C. R. 1971. *Crime prevention through environmental design*. Beverly Hills, CA: Sage.

Jensen, S. U. 1998. DUMAS: Safety of pedestrians and two-wheelers. Note no. 51. Road Directorate, Division of Road Safety and Environment, Copenhagen, Denmark.

Jones, S. J., R. A. Lyons, A. John, and S. R. Palmer. 2005. Traffic calming policy can reduce inequalities in child pedestrian injuries: Database study. *Injury Prevention* 11:152-6.

King, W. D., and P. S. Palmisano. 1992. Racial differences in childhood hospitalized pedestrian injuries. *Pediatric Emergency Care* 8 (4): 221-4.

Loukaitou-Sideris, A. 2005. Is it safe to walk here? Design and policy responses to women's fear of victimization in public places. Conference proceedings. Research on Women's issues in transportation, 2 (pp.102-12). Washington, DC: Transportation Research Board.

Loukaitou-Sideris, A., R. Liggett, H. and Iseki. 2001. Measuring the effects of built environments on bus stop crime. Environment and Planning B. *Planning and Design* 28:255-80.

McMillan, T. E. Forthcoming. The relative influence of urban form on a child's travel mode to school. *Transportation Research*, Part A.

Mena, J. 2002. Mean street resurrected into safe haven. One of the toughest neighborhoods in Santa Ana celebrates its renewal. *Los Angeles Times*, October 28, B1.

Nasar, J. L., and B. Fisher. 1993. Hot spots of fear and crime. A multi-method investigation. *Journal of Environmental Psychology* 13:187-206.

Newman, O. 1972. Defensible space. Crime prevention through environmental design. New York: Collier.

Pasanen, E. 1992. Driving speeds and pedestrian safety; A mathematical model. Technical report no. REPT-77. Nordisk Kabelog Traadfabriker, Copenhagen, Denmark. Helsinki University of Technology, Laboratory of Traffic and Transportation Engineers, Espoo, Finland.

Pasanen, E. 1993. The video recording of traffic accidents. Report no. 1993:4. Helsinki, Finland, City Planning Department.

Perkes, C. 2001. Nonprofits buying into Minnie Street: Agencies are working to refurbish run-down housing in a Santa Ana neighborhood. *Orange County Register*, March 5, A.

Pitt, R., B. Guyer, H. Chung-Cheng, and M. Malek. 1990. The severity of pedestrian injuries in children: An analysis of the pedestrian injury causation study. *Accident Analysis and Prevention* 22:549-59.

Pyatok, M. 2000. Comment on Charles C. Bohl's "New Urbanism and the city: Potential applications and implications for distressed inner-city neighborhoods"—The politics of design: The New Urbanists vs. the Grass Roots. *Housing Policy Debate* 11 (4): 803-14.

Reza, H. G. 2001. Revamp of homes is dream realized: Tenants, residents of a poor area in Santa Ana will get 127 new apartments, thanks to a city bond issue. *Los Angeles Times*, July 29, B7.

Roberts I., T. Ashton, R. Dunn, and T. Lee-Joe. 1994 Preventing child pedestrian injury: Pedestrian education or traffic calming? *Australian Journal of Public Health* 18:209-12.

Ross, C. E. 2000. Walking, exercising, and smoking: Does neighborhood matter? *Social Science and Medicine* 51 (2): 265-74.

Schofer, J. L., K. K. Christoffel, M. Donovan, J. V. Lavigne, R. R. Tanz, and K. E. Wills. 1995. Child pedestrian injury taxonomy based on visibility and action. *Accident Analysis and Prevention*. 27:317–33.

Shankar, U. 2003. Pedestrian roadway fatalities. National Highway Traffic Safety Administration. Report no. DOT HS 809 456. Washington, DC: U.S. Department of Transportation.

Skogan, W. 1986. Fear of crime and neighborhood change. *Crime and Justice* 8:203-29.

Skogan, W. G. 1990. *Disorder and decline: Crime and the spiral decay in American neighborhoods*. New York: Macmillan.

Stevenson, M. R., S. K. Lo, B. A. Laing, and K. D. Joarzik. 1992. Childhood pedestrian injuries in the Perth metropolitan area. *Medical Journal of Australia* 156:234-8.

Taylor, R., and A. Harrell. 1996. *Physical environment and crime*. Washington, DC: National Institute of Justice Research Report.

Transportation Alternatives. 2002. *The 2002 summary of safe routes to school programs in the United States*. New York: Transportation Alternatives.

U.S. Department of Health and Human Services. 1996. *Physical activity and health: A report to the Surgeon General*. Atlanta: Author.

U.S. Department of Transportation. 1994. Final report: The national bicycling and walking study. Transportation choices for a changing America. Washington, DC: Author.

Wazana, A., P. Krueger, P. Raina, and L. Chambers. 1997. A review of risk factors for child pedestrian injuries: Are they modifiable? *Injury Prevention* 3:311-8.

Wekerle, G. R., and C. Whitzman. 1995. *Safe cities: Guidelines for planning, design, and management*. New York: Van Nostrand Reinhold.

Whitebread, D., and K. Neilson. 2000. The contribution of visual search strategies to the development of pedestrian skills by 4-11 year-old children. *British Journal of Educational Psychology* 70:539-57.

Zegeer, V., and S. F. Zegeer. 1988. Pedestrian and traffic control measures. *Transportation Research Board Synthesis*. Report no. 139. Washington, DC: National Academy of Sciences.

Zegeer, C., J. R. Stewart, H. Huang, P. Lagerway, J. Feaganes, and B. J. Campbell. 2005. Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. Report no. FHWA-HRT-04-100. McLean, VA: Federal Highway Administration.

Zelinka, A., and D. Brennan. 2001. Safescape: Creating safer, more livable communities through planning and design. Chicago: American Planning Association.