The Relationship of Built Environment to Perceived Social Support and Psychological Distress in Hispanic Elders: The Role of “Eyes on the Street”

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Background. Research on contextual and neighborhood effects increasingly includes the built (physical) environment’s influences on health and social well-being. A population-based study examined whether architectural features of the built environment theorized to promote observations and social interactions (e.g., porches, windows) predict Hispanic elders’ psychological distress.

Methods. Coding of built environment features of all 3,857 lots across 403 blocks in East Little Havana, Florida, and enumeration of elders in 16,000 households was followed by assessments of perceived social support and psychological distress in a representative sample of 273 low socioeconomic status (SES) Hispanic elders. Structural-equation modeling was used to assess relationships between block-level built environment features, elders’ perceived social support, and psychological distress.

Results. Architectural features of the front entrance such as porches that promote visibility from a building’s exterior were positively associated with perceived social support. In contrast, architectural features such as window areas that promote visibility from a building’s interior were negatively associated with perceived social support. Perceived social support in turn was associated with reduced psychological distress after controlling for demographics. Additionally, perceived social support mediated the relationship of built environment variables to psychological distress.

Conclusions. Architectural features that facilitate direct, in-person interactions may be beneficial for Hispanic elders’ mental health.

Key Words: Aging—Built environment—Hispanics/Latinos—Psychological distress—Social support.

STUDIES of the relationship between the physical characteristics of neighborhoods and residents’ health and behavior (e.g., cardiovascular disease, depression, physical activity) have increased appreciably in recent years (for reviews, see Diez Roux, 2003; Evans, 2003; Frumkin, Frank, & Jackson, 2004; Institute of Medicine and Transportation Research Board, 2005; Northbridge, Sclar, & Biswas, 2003). Concepts such as mixed land use and walkability at the neighborhood level have been shown to be related to residents’ health and social well-being (Clarke & George, 2005; Frank, Andresen, & Schmid, 2004; Kim & Kaplan, 2004; Leyden, 2003; Rohrer, Pierce, & Denison, 2004; Szapocznik et al., 2006). In contrast to the growing body of research relating built environment to health/wellness, few studies have examined the relationship of the neighborhood built environment to elders’ mental health (e.g., Berke, Gottlieb, Vernez Mouden, & Larson, 2007).

The present study investigates a further construct of “eyes on the street” (Jacobs, 1992), which involves the use of architectural and neighborhood design features that promote direct observation and interaction among individuals in a building and individuals walking in the street (Jacobs, 1992; Katz, 1994; Leccese & McCormick, 2000). Architectural features such as porches, stoops, and windows are hypothesized to facilitate social interactions and monitoring of behavior among residents (Evans, 2003; Leccese & McCormick, 2000; Leyden, 2003), which in turn promote social support (Jacobs, 1992; Kawachi, 1999; Leccese & McCormick, 2000). Such outcomes are highly desirable, given the strong evidence that social support is associated with a variety of positive health and behavioral health outcomes (Adler & Matthews, 1994; Cohen, 2004; House, Landis, & Umberson, 1988; Newsom & Schulz, 1996). The present study examined the built environment’s impacts on
Built Environment and Social Support

A limited but growing body of research has supported a possible connection between features of the built environment and social behavior. Aspects of the built environment, such as semiprivate space, seating, and open space, have been found to be related to increased supportive acts by neighbors and a higher sense of community attachment (Skjaeveland & Garling, 1997). Similarly, housing patterns that contain clustered homes with a shared central space have been found to increase spontaneous social interactions and connectedness with neighbors (Abu-Ghazaleh, 1999).

Other work suggests that characteristics of outdoor common spaces may play a role in the formation and maintenance of social ties in inner-city elders (Kweon, Sullivan, & Wiley, 1998). Such observations are significant because although research suggests that social support can be obtained without direct contact, face-to-face interactions are associated with greater perceived availability and adequacy of support (Seeman & Berkman, 1988; Wellman et al., 1973). Consequently, if physical characteristics of neighborhoods are not conducive to establishing contact, then obtaining support may be more challenging, particularly in older residents (Thompson & Krause, 1998).

Relevant to such research, urbanist theories such as those proposed by Jacobs (1992) and New Urbanist theory (Leccece & McCormick, 2000) hold that positioning buildings with porches, stoops, and windows close to the street or other public space promotes surveillance of the surrounding neighborhood and also allows neighbors to look out for one another (Jacobs; Leccece & McCormick, 2000). Combined with functional opportunities for interaction, such as residential entrances near pedestrian pathways, these features may promote increased social interaction and heightened social support (Evans, 2003; Fleming, Baum, & Singer, 1985; McCoy, 2002; Moos, 1976).

Social Support and Psychological Distress

The relationship between social support and both health and behavioral health (e.g., immune function, depression) is well established (Adler & Matthews, 1994; Cohen, 2004; House et al., 1988; Newsom & Schulz, 1996), with evidence that the benefits associated with social support and social interactions are particularly important for the elderly (Cormman et al., 2003; Krause et al., 1989; Liang, Krause, & Bennett, 2001; Lubben, 1988; Newsom & Schulz, 1996; Shaw, 2005). There is a particularly strong link between social support and depressive symptoms (Chou, 1999; Cohen & Wills, 1985; Newsom & Schulz, 1996). Moreover, perceived social support in particular may reduce older adults’ depression or anxiety over time because believing that emotional or tangible support is available if needed may cause people to spend less time worrying about life’s problems and daily hassles (Peirce, Frone, Russell, Cooper, & Mudar, 2000). In fact, prior research suggests that subjective evaluations of supportive encounters may be more strongly related to mental health than are objective markers of social support (e.g., frequency of contact with others; Jang, Haley, Small, & Mortimer, 2002; Krause, 1995). In addition, perceived support may enhance emotional functioning by promoting less threatening interpretations of adverse events and more effective coping strategies (Cohen & Wills, 1985). Further, satisfaction with one’s social support has been shown to be inversely related to future depression in older adults (Krause et al., 1989).

Built Environment, Social Support, and Psychological Distress

In summary, the existing literature suggests a model in which social support mediates the impacts of the built environment on elderly residents’ health and mental health outcomes. For example, the finding that older adults who reside in physically deteriorated neighborhoods perceive that social support is less available to them (Thompson & Krause, 1998) and have worse health (Krause, 1996, 1998) than do elders who reside in better-maintained neighborhoods suggests that low social support may partly account for the reduced health (Krause, 1996; Thompson & Krause, 1998) and possibly mental health (Krause, 1993) of elders residing in physically dilapidated neighborhoods. Similarly, features of the neighborhood built environment (e.g., physical dilapidation, neighborhood walkability) have been shown to predict individuals’ levels of psychological distress even after controlling for individual-level variables such as age, gender, and financial strain (Berke et al., 2007; Krause, 1996; Kruger, Reischl, & Gee, 2007; Weich et al., 2002). Furthermore, the ability of neighborhood features to promote social ties and social support has been hypothesized as one mechanism through which the built environment may operate on psychological distress (Berke et al., 2007; Evans, 2003; Kruger et al., 2007; Weich et al., 2002). We further hypothesize that the built environment’s effects on elderly residents’ psychological distress will be mediated by elders’ perceptions of the quantity and quality of the social support that they receive. However, to our knowledge few studies have examined these relationships simultaneously in any population.

Proposed Model

Based on the literature, the current study tested a two-step sociocognitive model examining (a) whether built
environment ‘eyes on the street’ features theorized to promote observation and interaction are associated with elders’ perceived social support and (b) whether perceived social support in turn is associated with reductions in psychological distress. We further examined whether perceived social support mediated the relationship between the built environment and elders’ psychological distress. To our knowledge, this is the first study that evaluates prospectively the impact of the built environment on these social environment and psychological variables in a single model. Moreover, we examined these relationships in a population-based sample of urban Hispanic elders of low socioeconomic status (SES), in whom we previously found a high rate (35%) of clinically relevant depressive symptoms (Perrino, Brown, Mason, & Szapocznik, in press): This population may be at particular risk for psychological distress due to a variety of factors, including limited financial circumstances, social isolation, and residence in inner-city neighborhoods (Falcón & Tucker, 2000; Perrino et al., in press; Stewart & Nápoles-Springer, 2000). We therefore examined the possible relationship of contextual variables (i.e., neighborhood built environment and elders’ perceived social support) to psychological distress in this study population, after controlling for demographics.

**Methods**

**Setting**

The study was conducted in East Little Havana, Florida, a well-defined urban community within the City of Miami, which in 2002 was the poorest large city in the United States (U.S. Census Bureau, 2002). East Little Havana is 93% Hispanic, with 19% of residents 65 years of age or older and 35% of residents living below the poverty level (U.S. Census Bureau, 2000). This community includes 3,857 lots in 403 blocks. East Little Havana is relatively densely built, with 40,865 residents living in an area of less than 3 square miles (U.S. Census Bureau, 2000). East Little Havana was selected for examination because it is a relatively homogeneous neighborhood with respect to sociodemographic characteristics (i.e., mostly Hispanic, with the highest rate of poverty in the county; U.S. Census Bureau, 2000) and yet demonstrates considerable variability in the built environment. For instance, built environment features, such as porches or windows, which were theorized to facilitate observation and social interaction (Jacobs, 1992; Leccese & McCormick, 2000), were differentially present across the blocks of this neighborhood, ranging from blocks without any porches or windows facing the street to blocks with many porches and windows facing the street (Spokane et al., 2007).

**Research Design**

This study is part of a larger, population-based, prospective cohort study entitled “The Hispanic Elders’ Behavioral Health Study,” which examines the relationship of the neighborhood built and social environment to Hispanic elders’ mental health outcomes. This study was approved by the University of Miami’s Institutional Review Board. To obtain data on the built environment, the 3,857 lots in the 403 blocks in East Little Havana were each assessed for their built environment features between 2000 and 2002. To obtain a population-based sample of Hispanic elders, a door-to-door survey enumerated all 16,000 households in the community, identifying 3,322 community-dwelling Hispanic elders 70 years of age or older living on 302 blocks. Eligible elders were located by trained Spanish-speaking enumerators who made up to 11 home visits to each address at different times of day and on multiple days of the week to identify the eligible elders in the neighborhood.

A sample of elders ages 70 and above was selected to maximize the likelihood of identifying an effect of the built environment on social and behavioral health outcomes. Horgas, Wilms, and Baltes (1998) found that elders ages 70 and above spend approximately 80% of their time at home in their neighborhoods. One Hispanic elder was randomly selected from each of the 302 blocks on which elders lived. If an elder refused to participate or did not meet inclusion criteria, a second randomly selected elder was approached, and so on, until one elder in each of the blocks with elders had been consented. Through this process, 521 elders were ultimately approached for possible participation, but of this total 248 were lost for the following reasons: 30 had died since enumeration, 95 refused, 87 had moved or could not be located/contacted after 11 home visits, 10 had incorrect home addresses, 24 did not meet other eligibility criteria, and 2 moved to a block from which an elder had already been sampled. The final sample at baseline consisted of 273 eligible elder participants living one each in 273 blocks (i.e., we were unable to sample elders from 29 of the 302 blocks on which elders resided, despite random resamplings from the same block, which occurred primarily because most of these 29 blocks had only one or two potential elders residing on them). As part of the larger study, participants completed four annual assessments of social support and behavioral health (i.e., psychological distress and cognition). The present analyses utilize baseline assessment data, with most baseline assessments completed in 2002–2003.

**Participants**

Inclusion/exclusion criteria were (a) 70 years of age or older, (b) born in a Spanish-speaking country, (c) resident of East Little Havana, (d) lives in housing in which he/she can walk outside (this excludes nursing homes and specialized locked housing units), (e) of sufficient physical health to go outside, and (f) obtained a score of 17 or above on the Mini-Mental State Examination (MMSE), a global measure of cognitive functioning (Folstein, Folstein, & McHugh, 1975). The final sample was 59% women and 87% Cuban born,
with a mean age of 78.5 years (SD = 6.3), an average of 7.3 years of education (SD = 4.3), and a mean annual household income of $9,300 (SD = $4,550). Participants’ average score on the MMSE was 24.8 (SD = 3.2). Thirty-four percent of participants were married and 7% were employed at baseline. Participants reported living in their home for an average of 13.7 years (SD = 11.3) and with an average household size of 1.8 residents (SD = 1.1). Participants were paid $25 for the baseline interview.

Measures

Control variables: Control variables included household income, gender (0 = men, 1 = women), age, and education in years. In addition, we also controlled for global cognitive functioning, as measured by the MMSE (Folstein et al., 1975), given prior findings that cognitive functioning is associated with social functioning and social support in older adults (e.g., Plehn, Marcopulos, & McLain, 2004; Zimmer, Ofstedal, & Chang, 2001).

Built environment: The built environment of the study area was measured using the University of Miami Built Environment Coding System (UMBECS; Spokane et al., 2007), a comprehensive coding system developed to assess built environment characteristics (Duany, 2000; Leccese & McCormick, 2000; Lombard et al., 2000; Spokane et al., 2007). Architecture students, trained using the UMBECS, coded each of the 3,857 lots in East Little Havana. Interrater reliabilities of .80 were required for a student to serve as a rater and for her/him to continue to conduct ratings throughout the study. As part of a larger assessment, each lot was coded on the following seven indicators assessing ‘eyes on the street’ (for illustrations of selected built environment variables, see Figure 1):

1. *Above grade*: defined as buildings that “sat” at least 12 inches above the level of the sidewalk.
2. *Stoop*: a small raised platform at the entrance of a building, typically composed of several steps, which provides a place for sitting.
3. *Porch*: any covered exterior space protecting the entrance to a building.
4. *Ground floor parking* was defined when the ground floor of a multistory building was dedicated to parking (hypothesized to be detrimental).
5. *Window area* reflects the proportion of building face comprising windows.
6. *Low sill height* windows (<3 feet from the sill of the dominant first floor window to the main level of the first floor). Low sill height allows the occupant to see more easily out to the street.
7. *Setback* reflects the distance from the building to the street (smaller setback being preferred, in order to see out over the street). For analytic purposes, this reverse-scored variable is termed “Small Setback.”

Data regarding these seven features were then weighted according to the frontage of the lot (i.e., the proportion of the block face corresponding to each lot) and each feature aggregated for each of the 403 blocks in East Little Havana. The resulting variable was an estimate of the proportion of the total block frontage for which each built environment feature was present. For further detail regarding the UMBECS coding system, see Lombard et al. (2000) and Spokane et al. (2007).

Perceived social support was assessed by two indicators in the Spanish language from Resources for Enhancing Alzheimer’s Caregiver Health (Wisniewski et al., 2003), based on items from Krause and colleagues (Krause, 1995; Krause & Markides, 1990). These indicators are highly related to each other and to elders’ behavioral health (Brown et al., in press; Krause & Liang, 1993; Krause et al., 1989): (a) “Satisfaction with support over the last month” assesses the elder’s satisfaction with tangible, informational, and emotional support received by her/him in the last month and consists of three, 4-choice Likert items (e.g., “Overall, how satisfied have you been in the last month with the help you have received with transportation, housework, yard work, and shopping?”; for the present sample, α = .71) and (b) “Satisfaction
with support over the last year” assesses the elder’s satisfaction with tangible, informational, and emotional support received by her/him in the last year and consists of three, 3-choice Likert items (e.g., “Are you satisfied with the amount of emotional support that you have received from others, or do you wish that others gave you this type of help more often or less often?” α = .73).

Psychological distress was measured by self-reported anxiety and depressive symptoms. Anxiety was measured using a 10-item, Spanish version of the Spielberger State Anxiety Inventory, taken directly from Spielberger’s larger State-Trait Personality Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). This measure has well-documented adequate reliability and validity (for this sample, α = .89) (Carmin, Pollard, & Gillock, 1999; Mote, Natalicio, & Rivas, 1971; Novy, Nelson, Smith, & Rogers, 1995). Depressive symptoms were assessed using the Spanish version of the Center for Epidemiological Studies–Depression scale (Carmin et al., 1999; Radloff, 1977), a 20-item, 4-choice Likert scale of symptoms that place an individual at risk for clinical depression. The measure has demonstrated adequate test–retest reliability and is widely used with the elderly (for this sample, α = .87) (Carmin et al.; Miller, Markides, & Black, 1997; Narrow, Rae, Moscicki, Locke, & Regier, 1990).

Analytic Strategy: Structural Equation Modeling

The hypothesized relationships were tested using structural equation modeling. Structural equation modeling was chosen over other analytic techniques, such as measured-variable path analysis, because it allows for investigation of complex models including relations among observed and latent variables and corrects for measurement error, thereby allowing for a more accurate test of mediational effects (Kaplan, 2000; Kline, 2005; Loehlin, 2004; McCrae, Black, & O’Connell, 2007). Structural equation modeling of the relationship of the built environment to perceived social support and psychological distress was conducted using AMOS 6 (Arbuckle & Wothke, 2005), while controlling for the relationships of age, gender, education, and income to psychological distress. Additionally, elders’ global cognitive functioning (i.e., MMSE; Folstein et al., 1975) was free to correlate with the built environment, support, and distress variables. Any missing data were addressed using a full information maximum likelihood algorithm (Arbuckle, 1996); however, there was a low level of missing data (<1.4%). Further analyses then assessed whether perceived social support mediated the relationship between any of the built environment variables and psychological distress. Mediation was tested using the asymmetrical distribution of products test (cf. MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002), which multiplies the unstandardized coefficients of the two paths that determine the mediating pathway and estimates a corresponding standard error. If the 95% confidence interval for this product does not include zero, then mediation is assumed. This approach is used rather than the traditional approach of Baron and Kenny (1986) to test for mediation because it is a more powerful test and is more appropriate for structural equation models (MacKinnon et al., 2002). Moreover, the asymmetrical distribution of products test has been shown to be superior to further methods of testing for mediation such as the distribution of the product of standardized path coefficients, both in terms of reducing the Type I error rate and in terms of being more accurate than methods based on an assumed normal distribution (MacKinnon et al., 2002; MacKinnon, Lockwood, & Williams, 2004).

RESULTS

Preliminary Analyses

Table 1 shows the zero-order correlations among the seven built environment variables. The selection of specific built environment latent variables was based on an examination of the covariance and correlation matrices for these variables because there were no prior data on which to base a priori predictions about how these data might be aggregated (i.e., this is the first study to examine these ‘eyes on the street’ variables). Based on the corresponding covariances, a model was developed in which three of these variables were combined into a latent variable, labeled “Front Entrance,” that refers to the relationship of the building’s entrance to the street and consisted of the proportion of a block in which buildings were above grade, possessed a stoop, and had a porch. Two other built environment variables were combined into a second latent variable, labeled “Windows,” that refers to features that increase visibility from the interior of a building and consisted of the average
portion of the building face devoted to windows on the block and the proportion of the block corresponding to low sill height. The remaining two built environment variables, “Ground-Floor Parking” and “Small Setback,” had weaker and less consistent relationships with the other six built environment variables and were therefore considered separately, as individual variables in the model (see Table 1).

In contrast, there existed an *a priori* plan to create specific latent variables for perceived social support and psychological distress based on the multiple indicators of each, assuming the correlations among the corresponding indicator variables were sufficient.

Perceived social support: The 1-month and 1-year measures of support satisfaction were significantly correlated (*r* = .312, *p* < .01) and were therefore combined into a single latent variable of perceived social support.

Psychological distress: The measures of anxiety and depressive symptoms were significantly correlated (*r* = .773, *p* < .001) and were therefore incorporated into a single latent variable of psychological distress.

Table 2 presents the factor loadings and distributional characteristics of the indicators for each latent variable in the final model, with factor loadings in the acceptable range (Comrey & Lee, 1992). Using these latent variables, a preliminary model was developed in which the built environment features predicted perceived social support and psychological distress, and perceived social support predicted psychological distress. In this model, the two built environment latent variables, Front Entrance and Windows, and the two observed built environment variables, Ground-Floor Parking and Small Setback, were allowed to covary. The built environment variables were also allowed to predict perceived social support and psychological distress. Perceived social support in turn was allowed to predict psychological distress. These hypothesized relationships are depicted in Figure 2.

**Final Model**

Based on the preliminary model, we conducted a subsequent analysis which eliminated all nonsignificant pathways to derive a final model (see Figure 3 for the structural portion of the model and Table 2 for the measurement portion of the model indicating the factor loadings of the individual indicators in the final model). Eliminating the five nonsignificant pathways (i.e., the one path from the Small Setback latent variable to perceived social support and the four paths from each of the four built environment variables to psychological distress) had no meaningful impact on the significance or stability of the other relationships tested. A chi-square difference test comparing the preliminary model and the final model further revealed there was not a statistically significant difference in the fit of the two models to the data (χ²(5) = 3.041, *p* > .69). Consequently, the simpler model with the fewest number of paths is preferred. Thus, only the results for the final model as depicted in Figure 3 (all paths presented were statistically significant, *p* < .05) are reported subsequently.

The fit indices computed for the final model suggested an acceptable fit to the data, χ²(87) = 119.106, *p* = .013, χ²/df = 1.369, Comparative Fit Index (CFI) = 0.948, Root Mean Square Error of Approximation (RMSEA) = 0.037 (Arbuckle, 2005; Kline, 2005). (Standard fit indices for structural equation modeling were used to evaluate the fit of the overall model to the data: Values of χ²/df < 3, CFI > 0.90, and RMSEA < 0.08 suggest adequate model fit [Arbuckle, 2005; Kline, 2005].) In the final model, the two latent built environment variables and the two observed built environment variables continued to be free to correlate with each other, as did the control variables. (With regard to significant correlations between the control variables and the main analytic variables in the final model, there was a significant correlation between global cognitive functioning and perceived social support [φ = 0.28], indicating that...
elders with higher levels of cognitive functioning reported being more satisfied with their social support. In addition, psychological distress was significantly correlated with both income \( \phi = -0.14 \) and female gender \( \phi = 0.20 \), suggesting that psychological distress was higher in lower-income elders compared with higher-income elders and was higher in women than in men.) Each of the two latent built environment variables predicted social support, albeit in different directions. As predicted, the Front Entrance latent variable was predictive of higher levels of perceived social support, indicating that elders who lived on blocks with greater proportions of frontage that included porches, stoops, and buildings built above-grade reported higher scores on the social support variables. In contrast, the Windows latent variable was also related to perceived social support, but in the opposite direction of what was predicted, indicating that elders who lived on blocks with greater proportions of window area and/or greater low sill height reported lower levels of social support. With regard to the observed built environment variables, Ground-floor Parking was negatively related to perceived social support, with blocks with higher proportions of ground-floor parking associated with lower levels of social support. The remaining observed built environment variable, Small Setback, was not related to social support. None of the built environment variables were directly related to psychological distress. However, as predicted, the perceived social support latent variable was inversely related to the psychological distress latent variable, with those elders reporting higher levels of social support reporting lower levels of depressive symptoms and anxiety.

Table 2. Loadings and Distributional Statistics of Measured Indicators in the Final Structural Equation Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized Lambda (( \lambda )) Loadings</th>
<th>Mean (Observed)</th>
<th>(SD) (Observed)</th>
<th>Range (Observed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Built environment variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Front entrance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above grade</td>
<td>0.69</td>
<td>0.44</td>
<td>0.25</td>
<td>0–1</td>
</tr>
<tr>
<td>Stoop</td>
<td>0.79</td>
<td>0.30</td>
<td>0.21</td>
<td>0–0.91</td>
</tr>
<tr>
<td>Porch</td>
<td>0.41</td>
<td>0.09</td>
<td>0.11</td>
<td>0–0.55</td>
</tr>
<tr>
<td>Ground floor parking</td>
<td>—</td>
<td>0.02</td>
<td>0.06</td>
<td>0–0.50</td>
</tr>
<tr>
<td>Windows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window area</td>
<td>0.68</td>
<td>0.63</td>
<td>0.17</td>
<td>0.10–0.98</td>
</tr>
<tr>
<td>Low sill height</td>
<td>0.55</td>
<td>0.44</td>
<td>0.23</td>
<td>0–1</td>
</tr>
<tr>
<td>Small setbackb</td>
<td>—</td>
<td>0.25</td>
<td>0.18</td>
<td>0–0.99</td>
</tr>
<tr>
<td><strong>Psychosocial variables</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Perceived social support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support satisfaction (month)</td>
<td>0.46</td>
<td>7.61</td>
<td>2.13</td>
<td>0–9</td>
</tr>
<tr>
<td>Support satisfaction (year)</td>
<td>0.73</td>
<td>5.66</td>
<td>0.89</td>
<td>3–9</td>
</tr>
<tr>
<td>Psychological distress</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.81</td>
<td>20.33</td>
<td>8.10</td>
<td>10–40</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>0.96</td>
<td>12.99</td>
<td>10.63</td>
<td>0–42</td>
</tr>
</tbody>
</table>

*Controls for gender, age, education, income, and functional status.

Notes: *Values indicate the proportions of block frontage that correspond to each built environment feature.

b Small setback is reverse scored so that higher values correspond to shorter distances from the building to the street.
Tests for Mediation

Analyses then examined whether perceived social support mediated each of the three significant relationships between the built environment (i.e., Front Entrance, Windows, and Ground-Floor Parking) and psychological distress. First examined was whether perceived social support mediated the relationship between the Front Entrance latent variable and psychological distress. This was done by multiplying the unstandardized path coefficient from the Front Entrance latent variable to perceived social support, by the unstandardized path coefficient from perceived social support to psychological distress and estimating a corresponding standard error for this product term: The confidence interval for this initial test of mediation did not include zero (product of unstandardized paths = –8.09, 95% confidence interval ranged from −13.31 to −2.88). Because zero is not included in the confidence interval, perceived social support appears to mediate the relationship between Front Entrance and psychological distress. Second examined was whether perceived social support mediated the relationship from the Windows latent variable to psychological distress. Again, this was done by multiplying the unstandardized path coefficient from the Windows latent variable to perceived social support, by the unstandardized coefficient from perceived social support to psychological distress, and estimating a corresponding standard error. The confidence interval for this test once again did not include zero (product of unstandardized paths = 13.47, 95% confidence interval ranged from 5.27 to 21.67). Therefore, perceived social support can be said to mediate the relationship between Windows and psychological distress. Third, we examined whether perceived social support mediated the relationship from the Ground-Floor Parking latent variable to psychological distress. Again, this was done by multiplying the unstandardized path coefficient from the Ground-Floor Parking latent variable to perceived social support, by the unstandardized coefficient from perceived social support to psychological distress, and estimating a corresponding standard error. The confidence interval for this test once again did not include zero (product of unstandardized paths = 11.71, 95% confidence interval ranged from 3.88 to 19.53). Therefore, perceived social support can be said to mediate the relationship between ground-floor parking and psychological distress.

Discussion

As predicted, results suggested a two-step process, in which features of the built environment impacted perceived social support, which subsequently impacted psychological distress. Additionally, we found that perceived social support mediated the relationship between built environment variables and psychological distress, which is consistent with the view that social support may be one of the underlying mechanisms through which the built environment operates on psychological distress (Berke et al., 2007; Evans, 2003; Kruger et al., 2007; Thompson & Krause, 1998). Of particular interest is the differential direction of the relationships of the two latent built environment variables to perceived social support and psychological distress. As predicted, the Front Entrance latent variable, which included porches, stoops, and buildings built above grade had a positive relationship to perceived social support. In contrast, and contrary to prediction, the Windows latent variable, which included window area and low sill-height windows, had a negative relationship to perceived social support. It is possible that features such as front porches, stoops, and homes built above grade, which provide opportunity for person-to-person contact and interaction, may encourage the elder to go outside and hence facilitate the direct social interactions leading to higher perceived levels of support. On the other hand, while larger window areas and lower sill heights may allow for broader observation of the surrounding area, they may also remove individuals from close person-to-person contact with elders and hence may result in reduced feelings of personal social support for elders themselves. Thus, for elders living in a neighborhood like East Little Havana, social support may be a “ground-level” phenomenon, facilitated by built environment features that promote direct, close-proximity, person-to-person interaction in the exterior of a building (see also, e.g., Kweon et al., 1998; Skjaeveland & Garling, 1997).

In addition, post hoc analyses found that buildings with porches and stoops tended to be older (pre-1945) than buildings without porches and stoops (post-1945). One interpretation is that pre-1945 buildings are most likely to be associated with higher levels of perceived social support among neighbors and residents because they incorporate features such as porches and stoops that increase face-to-face interactions (Katz, 1994; Leccese & McCormick, 2000) and related pedestrian activity (Berrigan & Troiano, 2002). This interpretation is consistent with the finding that residents’ levels of depressive symptoms were higher in dwellings of recent construction (i.e., post-1969 construction) than in dwellings of less recent construction (i.e., pre-1969 construction) (Weich et al., 2002), and the finding that elders’ depressive symptoms were higher in less walkable neighborhoods than in more walkable neighborhoods, which are often older (Berke et al., 2007; Handy, 1996). This interpretation is also consistent with recent suggestions that social support may mediate the impacts of the built environment on residents’ mental health (e.g., Berke et al., 2007).

As predicted, higher levels of ground-floor parking on a block were associated with less perceived social support and greater psychological distress. This was not surprising, given that ground-floor parking (or a building built directly above a parking lot) is thought to be the equivalent of an obstructed front entrance, which effectively reduces visual and physical contacts between the resident in the building and the pedestrian on the street.

It was surprising, however, that the Windows latent variable had a negative relationship to perceived social support. It was predicted that living on a block where either a high proportion of the building face comprised windows or a greater proportion of windows had low sill heights would
lead to higher levels of perceived support because window area and lower sill heights are believed to allow residents inside the home to better observe and monitor events occurring outside. It is possible that when the building facades on a block are covered almost entirely by windows, residents on that block may feel less individual responsibility to assist in an emergency or nonemergency situation because they see that other observers are potentially available to provide help, and thus the responsibility for helping is diffused among multiple observers on that block (Darley & Latané, 1968; Jones & Foshy, 1984). An alternative explanation may be that, due to residents’ concerns about privacy, the presence of substantial window area on the block may result in residents on that block feeling more “exposed,” and therefore residents may be more likely to block windows with curtains or blinds, thus inhibiting interaction. This may particularly be the case when extensive proportions of building facades are covered by glass (i.e., floor-to-ceiling windows), given that large expanses of glass do not allow the same type of privacy as a single, traditional window. This interpretation is consistent with recent suggestions that psychosocial functioning is worse when conditions do not promote a sufficient balance between privacy and public space (Skjæveland & Garling, 1997; Weich et al., 2002). A feeling of vulnerability to outsiders or concern about security may be particularly relevant to elders who reside in a low-SES urban neighborhood (Thompson & Krause, 1998; Young, Russell, & Powers, 2004). A third possible explanation is that when most of the building facades on a block are covered with windows, elders may not go outside, which may inhibit much needed social interaction: This is consistent with the longstanding view in the gerontological literature that environmental conditions should strike a balance between needs for comfort and challenge to maintain optimal psychological functioning (Lawton, 1989, 1998).

With further regard to the negative relationship of the two Windows variables (i.e., window area and low sill height) to social support, we are not suggesting that it is optimal to have no windows on a block. That would be extrapolating beyond the data, given that all of the blocks in East Little Havana contained at least some windows (i.e., >10% of the building facades on each block consisted of windows). Moreover, we acknowledge previous findings suggesting that windows may have multiple health benefits, including the restorative effects of views to nature (Ulrich, 1984) and of exposure to daylight from windows (Küller & Lindsten, 1992) on individuals’ health and well-being. Rather, we note that all elders had at least some windows, but that for this population of elders in this particular urban community of East Little Havana, blocks with the greatest proportions of window area and of windows with low sill height were associated with the least amounts of perceived social support and greatest amounts of psychological distress among our elders.

Taken as a whole, the findings suggest that the highest benefits for elders appear to occur on blocks with a greater number of positive front-entrance features (e.g., porches, stoops), which tend to be above grade and which offer a three-dimensional “transitional space” between the interior and the exterior of the building and between the height of the pedestrian and the height of the resident. This space is clearly the domain of the resident but beyond the privacy of the interior. A resident who chooses to occupy the transitional space just above the direct eye-to-eye level of the pedestrian is announcing a willingness to participate in the life of the street without inviting the street into the house. Therefore, people looking at someone on a stoop or a porch are responding to a social invitation, in which the resident’s presence outside announces a willingness to interact or, at the very least, to be seen. This may account for the greater perceived social support and reduced psychological distress of residents who live on blocks with more porches and stoops, as compared with blocks with fewer porches and stoops (for similar findings, see, e.g., Abu-Ghazzeh, 1999; Skjæveland & Garling, 1997). In contrast, blocks where either a high proportion of the building face comprised windows or a greater proportion of windows had low sill heights may be associated with reductions in perceived social support and greater psychological distress because these built environment features may promote unwanted visual/social contacts (i.e., people looking into someone’s home are unbidden) and therefore the resident can only choose whether to be observed or hidden. These unwanted visual or social contacts may result in a loss of personal control, and much prior work suggests that uncontrollable social interaction may result in increased helplessness, greater stress, and feelings of psychological distress (see, e.g., Baum & Valins, 1979; Evans, 2003).

The present findings build upon the authors’ prior “transdisciplinary” program of research—reflecting the combined contributions of behavioral scientists, health scientists, and architects—and suggest that objective built environment features impact community social processes and residents’ behavioral health outcomes (Spokane et al., 2007; Szapocznik et al., 2006). Moreover, these results are reminiscent of earlier findings suggesting that built environment characteristics (e.g., green outdoor common spaces) influence social interactions and behavioral health (e.g., coping) in innercity adults (Kuo, 2001; Kweon et al., 1998; Sullivan, Kuo, & De Pooter, 2004).

Several strengths inherent in this study should be noted. This is one of the first studies to explore both neighborhood physical and social conditions as possible protective factors for behavioral health problems in Hispanic elders residing in urban, low-SES neighborhoods (e.g., Espino, Lichtenstein, Palmer, & Hazuda, 2001). In addition, this is the first study of which we are aware to examine block-level built environment variables as predictors of protection/risk in elderly adults, based on a theory-driven model (Duany, 2000;
Jacobs, 1992; Leccese & McCormick, 2000). In addition, this study captured fine-grained lot-level information on the built environment in the area immediately around the individual’s home, which may be especially applicable to elders rather than arbitrary Census-defined boundaries (see, e.g., Berke et al., 2007). Moreover, the study uses objective measures of built environment and uses a population-based sample of community-dwelling Hispanic elders. The longitudinal nature of the data collection provides additional strength: Built environment data were collected in 2000–2002, whereas psychosocial data were collected in 2002–2004, allowing for greater confidence in judgments of causality. However, this analytic strategy precluded us from examining the impacts of changes in the built environment, social support, and psychological distress over time. Future research should explore change trajectories among these variables over longer time periods. Finally, we identified substantial variability in built environment which was predictive of social support and psychological distress.

Nevertheless, the inherent inability to randomly assign elders to blocks allows for potential self-selection bias. For example, elders who are less sociable or more depressed or of lower SES may move to blocks that have fewer positive built environment features that encourage social interaction (e.g., porches, stoops). In addition, while built environment was assessed objectively, measures of social support and psychological distress were self-reported, and unmeasured personality characteristics or attributional styles may have impacted those measures. Similarly, additional unmeasured mediating variables such as collective efficacy, block-level SES, block-level density, residential stability, safety, or age distribution of residents on each block may have also accounted for variance in elders’ perceived social support and psychological distress (Cutrona, Wallace, & Wesner, 2006; Espino et al., 2001; Galea, Ahern, Rudenstine, Wallace, & Vlahov, 2005; Kuhansky et al., 2005; Sampson, Raudenbush, & Earls, 1997; Thompson & Krause, 1998). Additionally, the present research examined effects of the built environment at the block level, and future research should consider the possible mental health impacts of the built environment at other geographic levels of analysis (e.g., the home level, the neighborhood level). Similarly, we did not assess whether participants owned their own home, although there was a low rate of home ownership (8.6%) for East Little Havana as a whole (U.S. Census Bureau, 2000). Moreover, although we considered time in home as an additional covariate in our analyses, this was unrelated to the psychosocial variables or to any of the built environment variables—which were examined at the block level. Future research should therefore consider the potential impacts of home ownership, time in home, and building characteristics on elders’ social and mental health outcomes, over and beyond the effects of surrounding neighborhood environmental characteristics (see, e.g., Brown, Perkins, & Brown, 2003; Krause, 1998; Lawton, Nahemow, & Teaff, 1975; Young et al., 2004). A further limitation is that over 40% of older adults randomly selected for participation were not enrolled, primarily due to deaths, refusals, and moves away from the study area. Furthermore, the work is based on elders, ages 70 and above, in a single community with its own specific characteristics, such as low SES, predominantly Hispanic, with limited home ownership (U.S. Census Bureau, 2000), and with purely residential blocks within a 5-min walk of commercial blocks, which may not be reflective of other communities in which elders live. Similarly, although we titled the manuscript “Hispanic,” we acknowledge that 87% of the sample was Cuban born. This may limit the generalizability of the findings, requiring replication in both similar and fundamentally different communities, including other Hispanic subgroups and non-Hispanics, and with larger sample sizes. Finally, although our findings are consistent with prior suggestions that built environment features may promote social contacts with neighbors (Jacobs, 1992) and perceived availability of support (Thompson & Krause, 1998), our social support items did not specify the referent for the social support transaction (e.g., whether the source of any received support was a friend or a family member or neighbor of the elder). Future research on the relationship of the built environment to social support should use more sensitive measures of the source, type, and reaction to social support.

In sum, the results suggest that the neighborhood built environment in which Hispanic elders live may have a modest, but important positive impact on their perceptions of the quality and quantity of social support that they receive, which can then lead to reduced psychological distress. From a public health perspective, even these “small” effects of the built environment can be of considerable significance because of the pervasiveness of the built environment. The finding of this and other studies suggesting the neighborhood built environment may be an important determinant of health (Berke et al., 2007; Clarke & George, 2005; Diez Roux, 2003; Evans, 2003; Frank et al., 2004; Institute of Medicine and Transportation Research Board, 2005; Kruger et al., 2007; Rohrer et al., 2004; Szapocznik et al., 2006) suggests the need for more research to identify the specific environmental characteristics that may best promote elders’ mental functioning and independence.

Funding
This work was supported by a National Institute of Mental Health/National Institute of Environmental Health Sciences Grant No. MH 65709 (J.S., Principal Investigator [PI]; A.R.S., Co-Principal Investigator [Co-PI]), by a National Institute on Aging Grant No. AG 027527 (J.S., PI; S.C.B., Co-PI), and by a Robert Wood Johnson Foundation Grant No. 037377 (J.S., PI; E.P.Z., Co-PI).

Acknowledgments
We acknowledge Monica Zarate, Rosa Verdeja, Tatiana Clavijo, Aleyda Marcos, and Patricia Thomas for their assistance in the conduct of the study. We thank Dr. Tatiana Perrino for her helpful comments on an earlier version of the manuscript. S.C.B. was responsible for the conduct of the
study, wrote and revised the manuscript, supervised data analysis and interpretation, and performed data analysis and interpretation. C.A.M. performed data analysis and interpretation, provided statistical and methodological expertise, and assisted with writing and revising the manuscript. J.L.L. and F.M. supervised the collection of the built environment data and contributed to writing and revising the manuscript and interpreting the analytic results. E.P.-Z contributed to study conceptualization and interpretation of the analytic results. A.R.S. and F.L.N. contributed to study conceptualization, supervising the conduct of the study, writing and revising the manuscript, and interpreting the analytic results. H.P. contributed to writing and revising the manuscript and interpreting the analytic results. J.S. conceived of the study and supervised all aspects of its implementation, including writing and revising the manuscript and interpreting the analytic results.

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Received February 5, 2008
Accepted October 8, 2008
Decision Editor: Kenneth F. Ferraro, PhD