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LONGITUDINAL RELATIONSHIPS BETWEEN NEIGHBORING BEHAVIOR AND DEPRESSIVE SYMPTOMS IN HISPANIC OLDER ADULTS IN MIAMI, FLORIDA

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Abstract

This study examines the relationship between neighboring behavior and depressive symptoms across 3 years in a prospective study of 273 community-dwelling, Hispanic older adults in Miami, Florida. The analyses extend the literature by testing for a bidirectional or reciprocal relationship between neighboring behavior and depressive symptoms over time and examining the relationship between these variables in Hispanic older adults, a group at risk of developing depressive symptoms. Structural Equation Modeling with a cross-lagged panel design showed that depressive symptoms were unrelated to subsequent neighboring behavior. However, neighboring behavior was related to subsequent depressive symptoms at every time point, such that higher levels of neighboring behavior were related to lower levels of depressive symptoms. Findings suggest that neighboring behavior may be a protective factor against depressive symptoms in community-dwelling Hispanic older adults.

Although many studies have shown that supportive interactions with friends and family can have beneficial effects for older adults' mental health (e.g., Bisconti & Bergeman, 1999; Seeman, 2000; Zunzunegui, Alvarado, Del Ser, & Otero, 2003), relatively few studies have examined the potentially salutary effects of elders' interactions with, and support from, neighbors (Brown et al., 2009; Wethington & Kavey, 2000). Neighboring behavior, defined as positive social interactions and exchanges of support with one's neighbors for their mutual benefit, may be particularly important for older adults over age 70, who spend much of their time at home, in their neighborhoods (Horgas, Wilms, & Baltes, 1998). The proximity of neighbors provides opportunities for social functions that other members of an elder's social network may not fulfill, such as having frequent face-to-face visits and chats with nearby residents, sense of community, and sense of mutual aid. Neighboring behavior can, therefore, improve the safety and health of elders by greater access to critical goods and

services (i.e., grocery shopping, medical care, and household maintenance) as well as providing a monitoring or “watching” function over the elder in his or her home (Wethington & Kavey, 2000). These prosocial behaviors may, therefore, increase older residents’ independence, social involvement, and well-being (Shaw, 2005; Wethington & Kavey, 2000), including their psychological well-being (Berghorn, Schafer, Steere, & Wiseman, 1978; Cantor, 1979; Rosow, 1967; Unger & Wandersman, 1982; Young, Russell, & Powers, 2004). In addition, the perception that others are available to provide support when needed has been associated with reduced psychological distress in elders (Krause, 1997; Wethington & Kessler, 1986).

To our knowledge, there have been relatively few studies examining the longitudinal relationship between neighboring behaviors and mental health over time. Furthermore, we are not aware of any studies that have examined neighborhood climate or social interactions with neighbors as a predictor of health and well-being in Hispanic elders. Hispanic Americans are now the largest minority group in the United States (U.S. Census Bureau, 2008) and will comprise 7.8 million Hispanic adults aged 65 and older by the year 2030 (Day, 1996). At the same time, little is known about the unique health challenges facing Hispanic elders, many of whom may be vulnerable to poor health outcomes, including depressive symptoms, due to a variety of factors including limited financial circumstances, low literacy, social isolation, and residence in inner-city urban neighborhoods (e.g., Black et al., 1999; Espino, Lichtenstein, Palmer, & Hazuda, 2001; Falcón & Tucker, 2000; Perrino, Brown, Mason, & Szapocznik, 2009; Stewart & Nápoles-Springer, 2000). This study, therefore, examines the longitudinal relationships between neighboring behavior and depressive symptoms in an understudied population: Hispanic older adults, who may be at particularly high risk of depressive symptomatology, when compared with non-Hispanic Whites (Black, Markides, & Miller, 1998; Falcón & Tucker, 2000; Perrino et al., 2009; Stewart & Nápoles-Springer, 2000). We theorize that neighboring behavior may impact elders’ depressive symptoms over time, that is, having more positive and supportive interactions with neighbors over time may lead to reduced depressive symptomatology in Hispanic elders.

Neighboring Behavior and Elders’ Mental Health

Prior cross-sectional research suggests that positive neighborhood social environments and related neighboring behaviors are an important correlate of psychological well-being in older adults (cf., Brown et al., 2009). Magaziner and Cadigan (1989) reported that neighbors were a significant community resource for older women who lived alone (see also Stoller and Pugliesi, 1988). Moreover, positive associations between participative interactions with neighbors and psychological well-being of elders have been obtained by Roach and O’Brien (1982) and Beck and Page (1988). Similarly, Berghorn et al. (1978) found that neighboring behavior was a significant component of the psychological well-being of older people, particularly for women. Furthermore, substantial evidence indicates that an active, engaged lifestyle, involving participation in social activities with members of one’s social network, which may include interactions with neighbors, may be associated with better mental and physical health outcomes in later adulthood (Rowe & Kahn, 1997).

Longitudinal Studies of Neighboring Behavior and Mental Health

In contrast, few studies have examined longitudinal changes in elders’ interactions and social support from neighbors over time and how these neighboring behaviors impact elders’ mental health over time (cf., Barnes, 2003; Fratiglioni, Wang, Ericsson, Maytan, & Winblad, 2000; Glass, Mendes de Leon, Seeman, & Berkman, 1997). Some studies have found that social isolation can lead to psychological distress over time (e.g., Bassuk, Glass,

& Berkman, 1999; Roberts, Kaplan, Shema, & Strawbridge, 1997). Moreover, Thomése, Van Tilburg, and Knipscheer (2003) found, using data from a longitudinal study among Dutch adults in later life on their relationships with neighbors, that friendly relationships with neighbors can provide security and a sense of integration. More recently, Herrero and Gracia (2007) used structural equation modeling to test the cross-lagged relationships of perceived community support, which included integration with and participation in the community, and depressive symptoms over a 6-month period in Spanish adults ages 18 and older (mean age of 42). We found it interesting that there was a relationship between perceived community support and depressive symptoms over time, but only in that earlier community support predicts later depressive symptoms, not vice versa (Herrero & Gracia, 2007). However, this study did not focus specifically on older adults. Thus, recent longitudinal findings (Herrero & Gracia, 2007; Thomése et al., 2003) may exemplify Cowen's (2000) theories about the importance of informal sources of support in the community, including neighbors, for mental health, but these relationships require more study in independently living older adults.

However, other studies suggest the reverse causality: Depression may lead to less neighboring behavior over time. For instance, changes in depressive symptoms in older adults have been shown to predict declines in social participation over time (Beekman et al., 2002). Similarly, depressed older individuals have been found to report smaller increases in emotional support and greater increases in negative interactions with network members including neighbors, over time, when compared with older individuals without depression (Gurung, Taylor, & Seeman, 2003). It is possible that depressed older adults may withdraw from, or have difficulty managing, the discretionary elements of their networks over time, including interactions with neighbors (Beekman et al., 2002; Gurung et al., 2003). A further, related view is that high levels of depressive symptoms may cause individuals to rate their social interactions and social support, including support from neighbors, more negatively (cf., Maher, Mora, & Leventhal, 2006). Alternatively, older individuals with high levels of distress may cause members of their social network such as neighbors to withdraw from them and resist further social interaction (Gurung et al., 2003; Vaerum & McCabe, 2001).

The Present Investigation

The present study therefore examines the relationships between neighboring behavior and depressive symptoms over a 3-year period in a population-based sample of Miami Hispanic elders, in whom we previously documented a high rate of clinically relevant depressive symptoms (Perrino et al., 2009). More specifically, this study examines whether neighboring behavior predicts elders' subsequent depressive symptoms, or whether depressive symptoms predict elders' subsequent perceptions of neighboring behavior. To our knowledge, this is the first study that has examined possible reciprocal relationships between neighboring behavior and depressive symptoms over time in community-dwelling Hispanic elders, and it does so over four timepoints (i.e., baseline and 12-, 24-, and 36-month post-baseline).

METHODS

Setting

The study was conducted in East Little Havana, in the City of Miami, Florida, which, in 2002, was the poorest large city in the United States (defined as cities with population over 250,000; U.S. Census Bureau, 2002). East Little Havana is over 93% Hispanic, with a relatively high proportion of elderly adults (i.e., 19% of residents are 65 years of age or older) and over 35% of residents living below the poverty level (U.S. Census Bureau, 2000). The East Little Havana area includes 403 blocks and 40,865 residents (U.S. Census Bureau, 2000).

Research Design

Data were collected as part of a larger, population-based, prospective cohort study of Hispanic older adults in Miami, FL, entitled *The Hispanic Elders' Behavioral Health Study*, which focuses on the relationship between neighborhood environmental factors and older adults' well-being, in particular, the built (physical) and social environment and residents' mental health outcomes. A door-to-door survey enumerated all 16,000 households in East Little Havana, identifying 3,322 community-dwelling Hispanic immigrant adults who were 70 years of age or older living on 302 blocks. A sample of older adults ages 70 and above was selected to maximize the likelihood of identifying an effect of the neighborhood social environment on mental health outcomes. Horgas and colleagues (1998) found that elders ages 70 and above spend approximately 80% of their time at home, in their neighborhoods. One Hispanic older adult was randomly selected from each block on which at least one older adult lived. If he or she refused to participate or did not meet inclusion criteria, a second randomly selected elder was approached for consent to screen, and so on, until one elder in each of the blocks with elders had been consented. Ultimately, the sample comprised all blocks in which an elder who consented to participate met criteria. The final sample consisted of 273 elders (living in each of 273 blocks) who consented to participate and met criteria. Of the 521 elders randomly selected for possible participation, 248 were lost for the following reasons: 95 refused participation, 87 had moved or could not be located or contacted after 11 home visits, 30 had died since enumeration, 10 had incorrect home addresses, 24 did not meet full eligibility criteria, and 2 moved to a different block from which a participant had already been sampled. As part of the larger study, elders completed a baseline assessment and three yearly follow-up assessments of neighborhood social behaviors and social supports, psychological distress, and cognitive functioning. The study was approved by the University of Miami's Institutional Review Board.

Participants and Procedure

To participate, individuals had to (a) be 70 years of age or older, (b) have immigrated from a Spanish-speaking country, (c) reside in East Little Havana, FL, (d) reside in housing in which they could walk outside (we excluded nursing homes), (e) be of sufficient physical health to go outside, and (f) have a score of 17 or higher on the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975), a test of global cognitive functioning. The standard Mini-Mental State Examination cut-point was lowered from 24 to 17 given concerns about this measure's lower sensitivity and specificity in detecting cognitive impairments among those with lower educational levels, and possible bias with regard to language use and immigrant status (Mungas, Marshall, Weldon, Haan, & Reed, 1996; Ostrosky-Solis, López-Arango, & Ardila, 2000). For the 273 elders in the study, the mean Mini-Mental score was 24.8 ($SD = 3.2$).

Participants completed yearly, home-based assessments in Spanish at baseline and at 12-, 24-, and 36-month follow-ups and were compensated \$25, \$30, \$35, and \$40 for assessment completion, respectively. Most baseline assessments were completed during 2002–2003. At baseline, the mean age of the adults was 78.5 (range = 70–100), and 59% were female. Approximately 86% were born in Cuba or relocated to Cuba as children, and 10% were born in a Central or South American country. Participants had lived in the United States an average of 29 years. The sample was that of low socioeconomic status, with 71% reporting an annual household income of less than \$10,000, and most reporting working-class jobs prior to retirement (e.g., factory worker, housekeeper). Participants also responded to a question about how difficult it was for them to pay for basic needs using a 7-point scale ranging from 1 (*easy*) to 7 (*very difficult*): The average score on this financial strain scale was 4.2 ($SD = 2.1$). The sample averaged 7.3 years of education ($SD = 4.3$; range = 0–20 years) and the average household size was 1.8 residents ($SD = 1.1$). Of the participants, 34%

were married, 35% were widowed, 20% were separated or divorced, and 11% had never married.

Measures

Neighboring behavior—*Neighboring behavior* was assessed by a 6-item subscale (i.e., supportive acts of neighboring) of the Multidimensional Measure of Neighboring (Skjaeveland, Garling, & Maeland, 1996), a 14-item scale assessing positive and negative dimensions of the neighborhood social environment, as follows: (a) supportive acts of neighboring, (b) neighborhood attachment, (c) neighbor annoyance, and (d) informal social ties. For purposes of the present investigation, we use the “supportive acts of neighboring” subscale. Sample items for this subscale include: “If I have a personal crisis, I have a neighbor I can talk to,” “If I don’t have something I need for my cooking, I can borrow it from a neighbor,” “I have made new friends by living here,” and “How often do you help your neighbors with small things, or they help you?” Higher scores indicate more positive neighboring behaviors (range of 6–26). This measure was translated into Spanish using the back-translation and committee approach recommended by Kurtines and Szapocznik (1995). At baseline, Cronbach alpha for the neighboring subscale in this sample was $\alpha = 0.85$.

Depressive symptoms—A Spanish translation of the 20-item Center for Epidemiologic Studies–Depression scale (CES-D; Radloff, 1977) was used to assess self-reported depressive symptoms in the preceding week. A continuous total sum score was computed, such that higher scores indicated more depressive symptoms (range of 0–60). The CES-D has demonstrated good test–retest reliability and has been used successfully with Hispanic and Spanish-speaking older adults (Black et al., 1998). At baseline, Cronbach’s alpha for the CES-D in this sample was $\alpha = 0.86$.

Control and descriptive variables—Control and descriptive variables included age, gender, and education at baseline, and the following variables at each time point: marital status, financial strain, functional status (i.e., measured by Mini-Mental State Examination; Folstein et al., 1975), and moves. Financial strain was assessed using a single item about how difficult it was to pay for basic needs using a response scale ranging from 1 (*easy*) to 7 (*very difficult*). Functional status was measured by the MiniMental State Examination (Folstein et al., 1975), a measure of global cognitive functioning commonly used with both Hispanic and non-Hispanic older adults and which is scored on a 0–30 point scale. In addition, elders’ moves at each time point was considered a further control and descriptive variable that may impact upon neighboring and depressive symptoms, and was coded as 0 (did not move) or 1 (moved since the prior time point). Seventy-nine participants (29%) moved at least once by the 36-month follow-up assessment, and the mean number of moves per participant was 0.35 ($SD = 0.62$).

Analytic Model

Preliminary analyses examined variable distributions, sample characteristics, and attrition. Preliminary analyses used AMOS 7 (SPSS, 2006). A cross-lagged panel design was used to test the relationships between neighboring behavior and depressive symptoms across time. Analyses considered age, gender, and education at baseline as covariates for each of neighboring behavior and depressive symptoms. In addition, the following variables were considered as time-varying covariates: marital status, financial strain, functional status, and moves. Post-hoc analyses considered the impact of missing data due to deaths on the relationship between neighboring behavior and depressive symptoms. Among the strengths of using a cross-lagged panel analysis approach is that it allows simultaneous analysis of the two dependent variables, thereby permitting the identification of possible bidirectional associations between neighboring behavior and depressive symptoms across time.

RESULTS

Attrition/missing data across time points

Participants decreased from 273 at baseline to 194 at the 36-month follow-up. By the 36-month follow-up, 77 participants were lost to follow-up (36 died, 16 refused, 9 moved out of greater Miami, 16 could not be located), and 2 participants either refused or could not complete either one of the analytic variables of interest (neighboring behavior; depressive symptoms) at the 36-month interview. Fewer than 1% of yearly evaluations were missed by survivors at each time point for reasons other than those given above (i.e., the participant could not be engaged for that year's evaluation). Additional missing data for the measures of neighboring behavior and depressive symptoms were as follows: (a) neighboring behavior, less than 1% and (b) CES-D, less than 1%. Missing data were addressed using a full information maximum likelihood (FIML) algorithm (Arbuckle, 1996).

Depressive symptoms and neighboring behavior in the sample

At baseline, slightly more than 35% ($n = 96$) of participants met the criteria for clinically-relevant levels of depressive symptoms (Perrino et al., 2009), based on the commonly used CES-D cut-off score of 16 and above (see Cho et al., 1993). Clinically-relevant symptoms were found in 29% of the sample at the 12-month follow-up, 28% at 24 months, and 29% at 36 months.

Means and standard deviations of the measures of neighboring behavior and depressive symptoms at each of the four assessments are presented in Table 1. On average, mean values for the two outcome measures were fairly stable over time. This was the case whether one examined the means based on all data at each time point (as presented in Table 1) or means based on only those individuals who remained in the sample through the 36-month follow-up. However, individual older adults did show meaningful changes in their own scores over time, with some showing increases and others showing decreases over the course of the study. When examining individual change over time, the mean level of change between the initial baseline assessment and the 36-month assessment on the depressive and neighboring scales was .69 to .86 standard deviations, respectively, with some individuals increasing and others decreasing over time. In other words, on average, the depressive symptoms typically increased or decreased over two thirds of a standard deviation, while neighboring scores typically increased or decreased over three-fourths of a standard deviation. However, because this change was positive for some and negative for others, the overall mean levels across all individuals stayed fairly flat.

Correlation matrix

Table 2 presents the bivariate correlations between variables at baseline, which suggested that women reported lower functional status, higher levels of financial strain, and were more likely to have a disrupted marriage, when compared with men. Women also reported lower neighboring scores and higher depressive symptoms scores at baseline than did men. In addition, higher depressive scores were associated with lower functional status, higher financial strain, having experienced marital disruption, and lower neighboring scores.

Development of Final Model—Primary analyses began with the development of the Final Model based on both sets of cross-lagged effects. Given the equal spacing of assessments, the three cross-lagged effects predicting depressive symptoms based on prior neighboring behavior (i.e., baseline neighboring behavior to 12-month depressive symptoms, 12-month neighboring to 24-month depressive symptoms, and 24-month neighboring behavior to 36-month depressive symptoms) were constrained to be equal. Similarly, the three cross-lagged effects predicting neighboring behavior based on prior

depressive symptoms (i.e., baseline depressive symptoms to 12-month neighboring behavior, 12-month depressive symptoms to 24-month neighboring behavior, and 24-month depressive symptoms to 36-month neighboring behavior) were also constrained to be equal.

To address the potential impact of elders' moves on subsequent neighboring scores, a dichotomous variable indicating a participant moved in between assessments was included as a predictor of the subsequent neighboring variable (i.e., a move between the baseline and 12-month assessment predicted 12-month neighboring behavior, a move between the 12-month and 24-month assessment predicted 24-month neighboring behavior, and a move between the 24-month and 36-month assessment predicted 36-month neighboring behavior).

The control variables of gender, marital status, financial strain, and functional status were also considered as predictors of both neighboring behavior and depressive symptoms, with significant effects included in the Final Model, and non-significant paths not included. Gender was related to neighboring behavior at baseline; and gender, marital status, financial strain, and functional status were all related to depressive symptoms at baseline. Marital status, financial strain, and functional status were also evaluated at each time point and considered for inclusion as time-varying covariates; however, this resulted in a dramatic decrease in model fit and generally non-significant pathways. Consequently, the final model did not include these as time-varying covariates. Finally, gender, marital status, financial strain, functional status, and the dichotomous variable indicating a move between baseline and the 12-month assessment were allowed to co-vary.

In addition, lag 2 effects for the neighboring behavior and depressive symptoms scores were included to further improve fit indices (note that the inclusion/exclusion of these paths did not impact the magnitude or statistical significance of the cross-lag effects that are the focus of the study). Lag 2 comprised four additional paths: baseline neighboring behavior to 24-month neighboring behavior, 12-month neighboring behavior to 36-month neighboring behavior, baseline depressive symptoms to 24-month depressive symptoms, and 12-month depressive symptoms to 36-month depressive symptoms. The inclusion of these paths allow for more cyclical patterns of effect and/or differential short- and long-term effects (e.g., state and trait; cf., Bracke, 1998; Chien & Dunner, 1996; Shahar & Davidson, 2003). To illustrate this, consider how this would influence predicted 24-month depressive symptoms scores for a person who fluctuated from below-average depressive symptoms scores at baseline to above-average depressive symptoms scores at the 12-month follow-up. A model with only a single lag path from 12-month depressive symptoms to 24-month depressive symptoms would predict relatively high levels of depressive symptoms at 24-months because the predicted score would only reflect the high levels of depressive symptoms at 12 months. In contrast, a model with an additional lag path from baseline depressive symptoms to 24-month depressive symptoms would predict 24-month depressive symptoms scores closer to the mean because these predicted scores would reflect both the high levels of depressive symptoms at 12-months and the previously lower levels of depressive symptoms at baseline. In essence, when scores fluctuate in more extreme ways over time, the lag 2 effect balances these fluctuations when predicting scores for subsequent assessments.

Final model results

As described previously, Figure 1 shows the "Final Model" in which all cross-lagged paths were estimated. Model fit indices showed an excellent fit to the data, specifically: $\chi^2/df = 1.24$, CFI = 0.976, and RMSEA = 0.029 (model $\chi^2(68) = 84.05$, $p = .09$). Regression weights and p-values for the control variables are shown in Table 3. As predicted, the cross-lagged effect of neighboring behavior predicting subsequent depressive symptoms was highly statistically significant (baseline neighboring behavior $\rightarrow$ 12-month depressive symptoms = $-.10$, $p = .001$; 12-month neighboring behavior $\rightarrow$ 24-month depressive

symptoms = $-.09$, $p = .001$; 24-month neighboring behavior → 36-month depressive symptoms = $-.11$, $p = .001$), while the cross-lagged effect of depressive symptoms predicting subsequent neighboring behavior was not significant (i.e., baseline depressive symptoms → 12-month neighboring behavior = $-.04$, $p = .29$; 12-month depressive symptoms → 24-month neighboring behavior = $-.03$, $p = .29$; 24-month depressive symptoms → 36-month neighboring behavior = $-.03$, $p = .29$). This suggests that elders reporting higher levels of positive neighboring experiences experienced lower levels of depressive symptoms 12 months later.

In addition to the observed cross-lag relationships between neighboring behavior and depressive symptoms described above, the final overall model also estimated the contemporaneous correlations between neighboring behavior and depressive symptoms at each timepoint. Although they are not shown in Figure 1 for greater ease of representation, these implied contemporaneous correlations between neighboring and depressive symptoms at each timepoint are nonetheless reflected in the overall analytic model and are described as follows: Baseline: $r = -.14$, $p < .05$; 12-month follow-up: $r = -.10$, $p > .05$; 24-month follow-up: $r = -.15$, $p < .05$; 36-month follow-up: $r = .24$, $p < .05$.

Post-hoc analyses

Two additional post-hoc analyses were conducted to assess for the potential impact of (a) initial functional status (i.e., global cognitive functioning, as measured by the Mini-Mental State Examination (MMSE) (Folstein et al., 1975)), which may impact depressive symptoms as well as interactions with neighbors, and (b) missing data due to deaths during the study. First, to determine whether the findings were driven by elders' initial functional status (i.e., those older adults evidencing the greatest risk of cognitive impairment, based on their MMSE (Folstein et al., 1975) scores at baseline), the Full Model was re-analyzed including only the 182 participants who had MMSE scores of 24 or greater at baseline. As indicated, this study's entry criteria required participants to have MMSE scores of 17 or above, a cut-point considered to be more appropriate for immigrant, non-English speaking groups with low educational levels. This post-hoc analysis using the more conservative cut-point of 24 provided a test of the study's model with a subgroup at lower risk for cognitive impairment. The cross-lagged path coefficients for this model showed a similar pattern to those from the Final Model. Specifically, the neighboring-to-depressive symptoms paths were statistically significant (baseline neighboring → 12-month depression = $-.09$, $p = .02$; 12-month neighboring → 24-month depression = $-.08$, $p = .02$; 24-month neighboring → 36-month depression = $-.10$, $p = .02$), whereas the depressive symptoms-to-neighboring paths were not statistically significant (i.e., baseline depressive symptoms → 12-month neighboring behavior = $-.06$, $p = .19$; 12-month depression → 24-month neighboring = $-.04$, $p = .19$; 24-month depression → 36-month neighboring = $-.05$, $p = .19$).

Second, to determine whether the loss of participants who had died during the study influenced the results, the Final Model was re-analyzed including only the 237 participants who remained alive through the 36-month follow-up assessment. Again, these results showed a pattern similar to the Final Model's findings, with the neighboring-to-depressive symptoms paths being highly statistically significant (baseline neighboring behavior → 12-month depressive symptoms = $-.10$, $p = .001$; 12-month neighboring behavior → 24-month depressive symptoms = $-.09$, $p = .001$; 24-month neighboring behavior → 36-month depressive symptoms = $-.12$, $p = .001$), and the depressive symptoms-to-neighboring paths being statistically non-significant (i.e., baseline depressive symptoms → 12-month neighboring behavior = $-.04$, $p = .25$; 12-month depressive symptoms → 24-month neighboring behavior = $-.03$, $p = .25$; 24-month depressive symptoms → 36-month neighboring behavior = $-.04$, $p = .25$). Finally, a further post-hoc analysis to assess the effects of attrition for any reason (including deaths, as well as refusals, etc.), we examined

the Final Model including only those 194 participants who remained in the study at all four study time points, and obtained similar results.

DISCUSSION

The present study investigated the longitudinal relationships between neighboring behavior (i.e., positive social interactions and support exchanged between neighbors) and depressive symptoms in a community-based sample of Miami Hispanic older adults, who are at risk for developing depressive symptoms (Perrino et al., 2009). We used structural equation modeling with a cross-lagged panel design to test for possible reciprocal relationships between neighboring behavior and depressive symptoms at four yearly time points (i.e., baseline, and 12-, 24-, and 36-months post-baseline). Neighboring behavior was predictive of future depressive symptoms at every time point, such that higher levels of neighboring behavior were related to lower levels of depressive symptoms. However, depressive symptoms were unrelated to subsequent neighboring behavior at any given time point.

The present results are consistent with prior suggestions that neighborhood social environments, including positive interactions with and support from neighbors, may be an important determinant of health and well-being in older adults (e.g., Cantor, 1979; Krause, 2003; Rosow, 1967; Unger & Wandersman, 1982). In addition, the present results are reminiscent of prior findings that perceived community support predicted future depressive symptoms 6 months later, but not vice versa, in Spanish adults (Herrero & Gracia, 2007; see also Thomése et al., 2003). Moreover, the finding that elders' moves predicted lower levels of neighboring behavior, which, in turn, predicted future depressive symptoms, is consistent with previous findings that residential relocation may negatively impact psychological well-being in elders, in part, through its disruption of social ties with neighbors (Fonda & Herzog, 2001; Sanders, Bowie, & Bowie, 2003). Taken as a whole, these findings suggest that neighboring behaviors may have a modest but statistically significant impact on depressive symptomatology in Hispanic older adults over time.

Strengths

The present investigation has several strengths. First, this is the only study of which we are aware to have examined the longitudinal relationships between neighboring behavior and depressive symptoms while testing for possible reciprocal or bidirectional relationships between these variables over time. Second, this is one of the first studies to have examined the social environment as a possible risk factor for mental health problems in Hispanic older adults residing in urban, low-SES neighborhoods (see, e.g., Espino et al., 2001; Ostir, Eschbach, Markides, & Goodwin, 2003). Third, the present study used a population-based sample of independently living Hispanic elders in a poor community in Miami, FL, in whom we previously documented a high rate (35%) of clinically-relevant depressive symptoms (Perrino et al., 2009). Fourth, despite the relatively restricted nature of this sample (i.e., primarily Cuban-American immigrants residing in a single community in Miami), we identified substantial variability in neighboring behavior that predicted changes in depressive symptoms in this sample over time. Fifth, the present analyses controlled for key sociodemographic variables (i.e., age, education, gender, financial strain, marital status, functional status) that have been shown to be related to elders' social behaviors and social support (e.g., Cruza-Guet, Spokane, Caskie, Brown, & Szapocznik, 2008; Glass et al., 1997; Kawachi & Berkman, 2001), as well as their depressive symptoms (e.g., Falcón & Tucker, 2000; Perrino et al., 2008, 2009).

Limitations and Future Directions

However, the present findings are not without their limitations. First, the measures of neighboring behavior and depressive symptoms were based on the elder's self-reports. Second, although we controlled for functional status (Folstein et al., 1975) in our analyses, data were lacking on other "third variables" such as number of health problems or personality traits (e.g., neuroticism, pessimism) or coping skills that may impact both neighboring behavior and depressive symptoms. Third, although we controlled for the elders' moves, due to the fact that 29% of elders moved by the 36-month follow-up, we did not consider the specific reasons for elders' moves including health, financial, or family reasons, which was beyond the scope of the present investigation (cf., Chen & Wilmoth, 2004). Fourth, the generalizability of the present findings has yet to be determined (e.g., in Hispanic and non-Hispanic elderly populations outside of Miami, including residents of communities that are *not* overwhelmingly Hispanic), and these results await replication in other populations (cf., Barnes, 2003). Fifth, data are lacking in the present study on the specific social ties and sources of social support for all members of the elder's social network (i.e., neighbors vs. friends vs. family members) and their respective contributions to elders' mental health. For instance, recent work on elders living in Havana, Cuba, suggests that adult children may be an important source of support for Cuban elders (Sicotte, Alvarado, León, & Zunzunegui, 2008). However, data are lacking in the present study as to whether adult children live in the elder's home or neighborhood and how often they interact with the elder. Therefore, although the present analyses controlled for marital status, it is unclear as to whether neighboring behavior is a mere adjunct or supplement to support that family members provide to the elder, or whether this sample of urban elders, many of whom live alone, are relying on neighbors or other individuals outside the family for the majority of their support (cf., Magaziner & Cadigan, 1989). Such determinations may be vital in guiding future intervention development. Therefore, future studies should more fully investigate longitudinal changes in older adults' interactions and social support from neighbors and other network members over time and how these relationships interact with one another as well as with older adults' health and well-being (e.g., Barnes, 2003; Glass et al., 1997; Sicotte et al., 2008). Sixth, the present study did not directly assess the elder's coping skills, and, therefore, it is possible that the measure of neighborhood support reflects, in part, the active seeking of help by the elder and that availability of support by neighbors is not the critical factor. Future research should, therefore, consider the role of coping—including the elder's ability to marshal support from neighbors and other network members—in relation to social support and depressive symptoms over time (see, e.g., Fisher, Segal, & Coolidge, 2003; Ho, 2007). Nonetheless, despite the above limitations in the present work, we found that neighboring behavior significantly predicted depressive symptoms, but not vice versa, over a 3-year period; this is the first study of which we are aware that has examined this relationship.

In summary, our findings suggest that neighboring behavior may have a modest but significant effect on Hispanic elders' psychological well-being over time. This may be particularly important, given findings that social isolation can lead to depression (e.g., Roberts et al., 1997), which, in turn, can hasten elders' relocation to institutional settings (e.g., Russell, Cutrona, de la Mora, & Wallace, 1997). Based on this work, public health strategies that might result in overall increases in social connectedness and related neighboring behavior are needed in communities with large numbers of elders such as East Little Havana. The impact of neighboring behavior on social support and mental health in community-dwelling elderly residents may provide bases for public health or psychosocial interventions that may help older adults to "age in place" in their homes without need for institutionalization (see for example, Clarke & George, 2005, for environments that support aging in place).

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REFERENCES

- Arbuckle, J.L. Full information estimation in the presence of incomplete data. In: Marcoulides, G.A.; Schumacker, R.E., editors. *Advanced structural equation modeling: Issues and techniques*. Lawrence Erlbaum Associates; Mahwah, NJ: 1996. p. 243-277.
- Barnes SL. Determinants of individual neighborhood ties and social resources in poor urban neighborhoods. *Sociological Spectrum*. 2003; 23:463-497.
- Bassuk SS, Glass TA, Berkman LF. Social disengagement and incident cognitive decline in community-dwelling elderly persons. *Annals of Internal Medicine*. 1999; 131(3):165-173. [PubMed: 10428732]
- Beck SH, Page JW. Involvement in activities and the psychological well-being of retired men. *Activities, Adaptation and Aging*. 1988; 11:31-47.
- Berghorn, F.J.; Schafer, D.E.; Steere, G.H.; Wiseman, R.F. *The urban elderly: A study of life satisfaction*. University Books; New York: 1978.
- Beekman ATF, Penninx BWJH, Deeg DJH, de Beurs E, Geerlings SW, van Tilburg W. The impact of depression on the well-being, disability and use of services in older adults: A longitudinal perspective. *Acta Psychiatrica Scandinavica*. 2002; 105:20-27. [PubMed: 12086221]
- Bisconti TL, Bergeman CS. Perceived social control as a mediator of the relationships among social support, psychological well-being, and perceived health. *The Gerontologist*. 1999; 39(1):94-103. [PubMed: 10028775]
- Black SA, Espino DV, Mahurin R, Lichtenstein MJ, Hazuda HP, Fabrizio D, et al. The influence of noncognitive factors on the Mini-Mental State Examination in older Mexican Americans: Findings from the Hispanic EPESE-Established Populations for the Epidemiologic Study of the Elderly. *Journal of Clinical Epidemiology*. 1999; 52(11):1095-1102. [PubMed: 10527004]
- Black SA, Markides KS, Miller TQ. Correlates of depressive symptomatology among community-dwelling Mexican Americans: The Hispanic EPESE. *Journals of Gerontology: Social Sciences*. 1998; 53B(4):S198-S208.
- Bracke P. Sex differences in the course of depression: Evidence from a longitudinal study of a representative sample of the Belgian population. *Social Psychiatry and Psychiatric Epidemiology*. 1998; 33:420-429. [PubMed: 9766168]
- Brown SC, Mason CA, Spokane AR, Cruza-Guet MC, Lopez B, Szapocznik J. The relationship of neighborhood climate to perceived social support and mental health in older Hispanic immigrants in Miami, Florida. *Journal of Aging and Health*. 2009; 21:431-459. [PubMed: 19318605]
- Cantor MH. Neighbors and friends: An overlooked resource in the informal support system. *Research on Aging*. 1979; 1(4):434-463.
- Chen P-C, Wilmoth JM. The effects of residential mobility on ADL and IADL limitations among the very old living in the community. *Journals of Gerontology: Social Sciences*. 2004; 59B:S164-S172.
- Chien AJ, Dunner DL. The Tridimensional Personality Questionnaire in depression: State versus trait issues. *Journal of Psychiatric Research*. 1996; 30(1):21-27. [PubMed: 8736463]
- Cho MJ, Moscicki EK, Narrow WE, Rae DS, Locke BZ, Regier DA. Concordance between two measures of depression in the Hispanic Health and Nutrition Examination Survey. *Social Psychiatry and Psychiatric Epidemiology*. 1993; 28:156-163. [PubMed: 8235801]
- Clarke P, George LK. The role of the built environment in the disablement process. *American Journal of Public Health*. 2005; 95:1933-1939. [PubMed: 16195520]
- Cowen, E. Community psychology and routes to psychological wellness. In: Rappaport, J.; Seidman, E., editors. *Handbook of community psychology*. Kluwer/Plenum; New York: 2000. p. 79-99.

- Cruza-Guet M-C, Spokane AR, Caskie GIL, Brown SC, Szapocznik J. The relationship between social support and psychological distress among Hispanic elders in Miami, FL. *Journal of Counseling Psychology*. 2008; 55:427–441. [PubMed: 22017550]
- Day, JC. Population projections of the United States by age, sex, race, and Hispanic origin: 1995 to 2050. U.S. Government Printing Office; Washington, DC: 1996. U.S. Bureau of the Census, Current Population Reports (Pub. No. P25-1130)
- Espino DV, Lichtenstein MJ, Palmer RF, Hazuda HP. Ethnic differences in Mini-Mental State Examination (MMSE) scores: Where you live makes a difference. *Journal of the American Geriatrics Society*. 2001; 49(5):538–548. [PubMed: 11380745]
- Falcón LM, Tucker KL. Prevalence and correlates of depressive symptoms among Hispanic elders in Massachusetts. *Journal of Gerontology: Social Sciences*. 2000; 55B(2):S108–S116.
- Fisher BM, Segal DL, Coolidge FL. Assessment of coping in cognitively impaired older adults: A preliminary study. *Clinical Gerontologist*. 2003; 26(3/4):3–12.
- Folstein MF, Folstein SE, McHugh PR. Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*. 1975; 12(3):189–198. [PubMed: 1202204]
- Fonda SJ, Herzog AR. Patterns and risk factors of change in somatic and mood symptoms among older adults. *Annals of Epidemiology*. 2001; 11(6):361–368. [PubMed: 11454494]
- Fratiglioni L, Wang H-X, Ericsson K, Maytan M, Winblad B. Influence of social network on occurrence of dementia: A community-based longitudinal study. *The Lancet*. 2000; 355:1315–1319.
- Glass TA, Mendes de Leon CF, Seeman TE, Berkman LF. Beyond single indicators of social networks: A Lisrel analysis of social ties among the elderly. *Social Science & Medicine*. 1997; 44(10):1503–1517. [PubMed: 9160440]
- Gurung RAR, Taylor SE, Seeman TE. Accounting for changes in social support among married older adults: Insights from the MacArthur Studies of Successful Aging. *Psychology & Aging*. 2003; 18(3):487–496. [PubMed: 14518810]
- Herrero J, Gracia E. Measuring perceived community support: Factorial structure, longitudinal invariance, and predictive validity of the PCSQ (Perceived Community Support Questionnaire). *Journal of Community Psychology*. 2007; 35(2):197–217.
- Ho APY. A peer counseling program for the elderly with depression living in the community. *Aging & Mental Health*. 2007; 11(1):69–74. [PubMed: 17164160]
- Horgas AL, Wilms HU, Baltes MM. Daily life in very old age: Everyday activities as expression of successful living. *The Gerontologist*. 1998; 38:556–568. [PubMed: 9803644]
- Kawachi I, Berkman LF. Social ties and mental health. *Journal of Urban Health*. 2001; 78(3):458–467. [PubMed: 11564849]
- Krause N. Anticipated support, received support, and economic stress among older adults. *Journal of Gerontology: Psychological Sciences*. 1997; 52B:P284–P293.
- Krause, N. Neighborhoods, health, and well-being. In: Wahl, H-W.; Scheidt, RJ.; Windley, PG., editors. *Annual Review of Gerontology and Geriatrics*. Vol. Vol. 23. *Aging in Context: Socio-physical Environments*. Springer; New York: 2003. p. 223-249.
- Kurtines, WM.; Szapocznik, J. Cultural competence in assessing Hispanic youths and families: Challenges in the assessment of treatment needs and treatment evaluation for Hispanic drug abusing adolescents. NIDA; Bethesda, MD: 1995. Report No. 95-3908
- Magaziner J, Cadigan DA. Community resources and mental health of older women living alone. *Journal of Aging and Health*. 1989; 1(1):35–49. [PubMed: 10293789]
- Maher MJ, Mora PA, Leventhal H. Depression as a predictor of perceived social support and demand: A componential approach using a prospective sample of older adults. *Emotion*. 2006; 6(3):450–458. [PubMed: 16938086]
- Mungas D, Marshall SC, Weldon M, Haan M, Reed BR. Age and education correction of Mini-Mental State Examination for English and Spanish-speaking elderly. *Neurology*. 1996; 46:700–706. [PubMed: 8618670]

- Ostir GV, Eschbach K, Markides KS, Goodwin JS. Neighborhood composition and depressive symptoms among older Mexican Americans. *Journal of Epidemiology and Community Health*. 2003; 57:987–992. [PubMed: 14652267]
- Ostrosky-Solis F, López-Arango G, Ardila A. Sensitivity and specificity of the Mini-Mental State Examination in a Spanish-speaking population. *Applied Neuropsychology*. 2000; 7:25–31. [PubMed: 10800625]
- Perrino T, Brown SC, Mason CA, Szapocznik J. Depressive symptoms among urban Hispanic older adults: Prevalence and sociodemographic correlates. *Clinical Gerontologist*. 2009; 32:26–43. [PubMed: 20882124]
- Perrino T, Mason CA, Brown SC, Spokane AR, Szapocznik J. Longitudinal relationships between cognitive functioning and depressive symptoms among Hispanic older adults. *Journals of Gerontology: Psychological Sciences*. 2008; 63B(5):P309–P317.
- Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977; 1(3):385–401.
- Roach MJ, O'Brien DJ. The impact of different kinds of neighborhood involvement on residents' overall evaluations of their neighborhoods. *Sociological Focus*. 1982; 15:379–391.
- Roberts RE, Kaplan GA, Shema SJ, Strawbridge WJ. Does growing old increase the risk for depression? *American Journal of Psychiatry*. 1997; 154(10):1384–1390. [PubMed: 9326820]
- Rosow, I. *Social integration of the aged*. The Free Press; New York: 1967.
- Rowe JR, Kahn RL. Successful aging. *The Gerontologist*. 1997; 37(4):433–440. [PubMed: 9279031]
- Russell DW, Cutrona CE, de la Mora A, Wallace RB. Loneliness and nursing home admission among rural older adults. *Psychology & Aging*. 1997; 12(4):574–589. [PubMed: 9416627]
- Sanders S, Bowie SL, Bowie YD. Lessons learned on forced relocation of older adults: The impact of Hurricane Andrew on health, mental health, and social support of public housing residents. *Journal of Gerontological Social Work*. 2003; 40(4):23–35.
- Seeman TE. Health promoting effects of friends and family on health outcomes in older adults. *American Journal of Health Promotion*. 2000; 14(6):362–370. [PubMed: 11067571]
- Shahar G, Davidson L. Depressive symptoms erode self-esteem in severe mental illness: A three-wave, cross-lagged study. *Journal of Consulting and Clinical Psychology*. 2003; 71(5):890–900. [PubMed: 14516237]
- Shaw BA. Anticipated support from neighbors and physical functioning during later life. *Research on Aging*. 2005; 27(5):503–525.
- Sicotte M, Alvarado BE, León E-M, Zunzunegui M-V. Social networks and depressive symptoms among elderly women and men in Havana, Cuba. *Aging & Mental Health*. 2008; 12(2):193–201. [PubMed: 18389399]
- Skjaeveland O, Garling T, Maeland JG. A multidimensional measure of neighboring. *American Journal of Community Psychology*. 1996; 24:413–435.
- SPSS, Inc.. *Amos 7.0: Structural equation modeling to test relationships*. Author; Chicago: 2006.
- Stewart AL, Nápoles-Springer A. Health-related quality-of-life assessments in diverse population groups in the United States. *Medical Care*. 2000; 38(9, Suppl. II):II-102–II-104. [PubMed: 10982096]
- Stoller EP, Pugliesi KL. Informal networks of community-based elderly: Changes in composition over time. *Research on Aging*. 1988; 10(4):499–516. [PubMed: 3227153]
- Thomése F, Van Tilburg T, Knipscheer KCPM. Continuation of exchange with neighbors in later life: The importance of the neighborhood context. *Personal Relationships*. 2003; 10(4):535–550.
- Unger DG, Wandersman A. Neighboring in an urban environment. *American Journal of Community Psychology*. 1982; 10(5):493–509. [PubMed: 7158615]
- U.S. Census Bureau. *United States Census 2000*. 2000.
- U.S. Census Bureau. [Retrieved September 22, 2008] Percent of people below poverty level. 2002. from <http://www.census.gov/acs/www/Products/Ranking/2002/pdf/R01T160.pdf>
- U.S. Census Bureau. [Retrieved September 22, 2008] U.S. Hispanic population surpasses 45 million: Now 15 percent of total. 2008. from <http://www.census.gov/Press-Release/www/releases/archives/population/011910.html>

- Vaerum VN, McCabe SB. Rejection of dysphoric actors and implications of depressive symptom display. *Journal of Social and Clinical Psychology*. 2001; 20:431–451.
- Wethington, E.; Kavey, A. Neighboring as a form of social integration and support. In: Moen, P.; Pillemer, K., editors. *Social integration in the second half of life*. Johns Hopkins University Press; Baltimore, MD: 2000. p. 190-210.
- Wethington E, Kessler RC. Perceived support, received support, and adjustment to stressful life events. *Journal of Health and Social Behavior*. 1986; 27(1):78–89. [PubMed: 3711634]
- Young AF, Russell A, Powers JR. The sense of belonging to a neighbourhood: Can it be measured and is it related to health and well being in older women? *Social Science & Medicine*. 2004; 59(12): 2627–2637. [PubMed: 15474215]
- Zunzunegui M-V, Alvarado BE, Del Ser T, Otero A. Social networks, social integration, and social engagement determine cognitive decline in community-dwelling Spanish older adults. *Journal of Gerontology: Social Sciences*. 2003; 58B(2):S93–S100.

Figure 1.
 Relationship between neighboring behavior and depressive symptoms across time: The full model.

Table 1

N, Means, Standard Deviations, and Cronbach Alpha of Neighboring Behavior and Depressive Symptoms

	<i>N</i>	<i>Mean</i>	<i>(SD)</i>	<i>Cronbach</i>
Neighboring behavior-baseline	273	16.96	(5.39)	0.85
Neighboring behavior-12 month	231	17.89	(5.28)	0.86
Neighboring behavior-24 month	213	17.60	(5.92)	0.91
Neighboring behavior-36 month	192	16.84	(5.96)	0.91
Depressive symptoms-baseline	273	12.99	(10.64)	0.86
Depressive symptoms-12 month	231	11.27	(9.09)	0.85
Depressive symptoms-24 month	214	11.31	(9.63)	0.88
Depressive symptoms-36 month	192	11.37	(8.71)	0.86

Table 2**Bivariate Correlations Among Baseline Variables**

	Female gender[†]	Functional status	Financial strain	Marital status^{††}	Neighboring behavior- baseline	Depressive symptoms-baseline
Female						
gender [†]	–	–.209**	.128*	.224***	–.123*	.204**
Functional status	–.209**	–	–.077	–.029	.029	–.193**
Financial strain	.128*	–.077	–	.019	–.070	.244***
Marital status ^{††}	.224***	–.029	.019	–	–.094	.175**
Neighboring behavior-baseline	–.123*	.029	–.070	–.094	–	–.165**
Depressive symptoms-baseline	.204**	–.193**	.244***	.175**	–.165**	–

[†]Gender dummy codes: male=0; female=1.

^{††}Marital status dummy codes: married/never married=0; disrupted marriage (e.g., separated/divorced/widowed)=1.

*
 $p < .05$.

**
 $p < .01$.

 $p < .001$.

Table 3

Control Variables in the Full Model, Path Regression Weights, and p-Values

Parameter	Path
Female gender [†] neighboring behavior at baseline	-.12 [*]
Female gender [†] depressive symptoms at baseline	.12 [#]
Financial strain depressive symptoms at baseline	.21 ^{***}
Marital status ^{††} depressive symptoms at baseline	.13 [*]
Functional status depressive symptoms at baseline	-.15 ^{**}

[†] Gender dummy codes: male=0; female=1.

^{††} Marital status dummy codes: married/never married=0; disrupted marriage (e.g., separated/divorced/widowed)=1.

^{*}
 $p < .05$.

^{**}
 $p < .01$.

^{***}
 $p < .001$.

[#]
 $p < .10$.