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Neighborhood Social Environment and Patterns of Depressive Symptoms among Patients with Type 2 Diabetes Mellitus

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Abstract

This study sought to examine whether neighborhood social environment was related to patterns of depressive symptoms among primary care patients with type 2 diabetes mellitus (DM). Neighborhood social environment was assessed in 179 patients with type 2 DM. Individual patient residential data at baseline was geo-coded at the tract level and was merged with measures of neighborhood social environment. Depressive symptoms at baseline and at 12-week follow up were assessed using the nine-item Patient Health Questionnaire (PHQ-9). Patients in neighborhoods with high social affluence, high residential stability, and high neighborhood advantage were much less likely to have a persistent pattern of depressive symptoms compared to a pattern of few or no depressive symptoms (adjusted odds ratio (OR) = 0.06, 95% confidence interval (CI) [0.01, 0.36]). Detrimental neighborhood influences may amplify risk for persistent depressive symptoms.

Keywords

primary health care; depression; type 2 diabetes; environment; social environment

Introduction

Depression is a risk factor for diabetes (Knol et al., 2006), and risk of depression is increased in patients with diabetes (Nouwen et al., 2010). By 2050 it is estimated that the number of older adults in developed countries with diabetes will increase by 220% (Narayan, Boyle, Geiss, Saaddine, & Thompson, 2006) yet the proportion of adults whose diabetes is controlled is decreasing over time (Koro, Bowlin, Bourgeois, & Fedder, 2004). Depression is not only common in patients with diabetes but also contributes to poor adherence to medication, dietary, and exercise regimens, poor glycemic control, reduced quality of life, disability, and increased healthcare expenditures (Gonzalez et al., 2008;

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Koopmans et al., 2009; Lustman & Clouse, 2005; Schram, Baan, & Pouwer, 2009; Simon et al., 2007; Von Korff et al., 2005). In fact, depression has been linked to prognostic variables such as micro- and macrovascular complications in diabetics (de Groot, Anderson, Freedland, Clouse, & Lustman, 2001). Depression and diabetes are major causes of disability and death (Murray & Lopez, 1996). Depression is an important indicator of health and well-being among patients with diabetes.

Prior work suggests that neighborhood social environment is associated with depressive symptoms (Julien, Richard, Gauvin, & Kestens, 2012; Kim, 2008; Mair, Diez Roux, & Galea, 2008), and the influence of neighborhood social environment on depression may be particularly salient for patients with diabetes. Increased exposure and susceptibility to detrimental neighborhood influences may amplify risk for depression or modify course of depression in patients with diabetes. A myriad of factors such as stressors (i.e. lack of resources and social disorder, including crime, violence, and illicit drugs) (Evans, 2003; Kim, 2008; Ross, 2000), issues related to the built environment (i.e. inadequate housing, poor local food environment, tobacco and alcohol outlets, lack of green space) (Evans, 2003; Kim, 2008; Ross, 2000), negative life events (King & Ogle, 2014), lack of social support (Kubzansky et al., 2005), and behavioral processes (de Vries McClintock et al., in press) may link neighborhood social environment with persistent depressive symptoms in patients with diabetes. Further study is needed to examine underlying mechanisms shaping the relationship between neighborhood social environment and depressive symptoms for patients with diabetes.

Patients with depressive symptoms and type 2 DM frequently do not get the supportive services they need to improve their health outcomes (McGlynn et al., 2003), even in practices where resources have been devoted to implementing the Chronic Care Model (Bodenheimer, Wagner, & Grumbach, 2002). As more is understood about the role of neighborhood context, interventions can be developed that effectively improve clinical outcomes. Neighborhood environment may be important to consider in the context of treatment regimens. Thus initiatives seeking to reduce the burden of co-morbid depressive symptoms and type 2 DM may need to incorporate environmental context in order to result in notable public health improvements. Community settings are therefore paramount for understanding and promoting the health and well-being of patients with diabetes and depression. Understanding how neighborhood factors influence depression in patients with diabetes will contribute to interventions and strategies for prevention.

Only one study was found that examined the association between neighborhood socioeconomic status (SES) and depression among primary care patients with type 2 diabetes mellitus (DM) (Gary-Webb et al., 2011). Gary-Webb and colleagues examined a group of overweight participants with type 2 DM in a trial of long-term weight loss. These researchers found a statistically significant association between lower neighborhood SES and poorer health status. Their results also suggest that lower neighborhood SES was associated with worse mental health. However, this study was limited by its cross-sectional design and strict eligibility criteria as the sample was participating in a weight loss intervention.

The present study sought to investigate whether indicators of neighborhood social environment (social affluence, neighborhood advantage and residential stability) were associated with patterns of depressive symptoms within a prospective randomized controlled trial. These constructs were developed from the work of Sampson et al. (Sampson & Raudenbush, 1999; Sampson, Raudenbush, & Earls, 1997) and tap into the underlying social context within which persons live in their neighborhood environment. This study differs from previous investigations in several ways. No study to date has linked indicators of neighborhood social environment with depressive symptoms over time in primary care patients with type 2 DM. Furthermore, indicators of social environment (social affluence, neighborhood advantage and residential stability) were assessed which have been found to be important constructs in elucidating the role of neighborhoods in health (Boardman, 2004; Matthews & Yang, 2010; Sampson et al., 1997; Yang, Matthews, & Shoff, 2011). Other studies have examined indicators of neighborhood social environment in relation to depression (Aneshensel et al., 2007; Hybels et al., 2006; Kubzansky et al., 2005; Kvaal et al., 2008; Menec, Shooshtari, Nowicki, & Fournier, 2010; Saarloos, Alfonso, Giles-Corti, Middleton, & Almeida, 2011; Wight, Cummings, Karlamangla, & Aneshensel, 2009; Wilson, Chen, Taylor, McCracken, & Copeland, 1999; Yen, Rebok, Yang, & Lung, 2008), but not in the context of diabetes.

The conceptual framework, adapted from Kim (2008) and shown in Figure 1, depicts the key constructs assessed in this study relating key features of the social environment to patterns of depression over time (Figure 1). The aim was to examine whether residents in neighborhoods with greater social affluence, advantage, and residential stability would be more likely to have a pattern of persistent depressive symptoms over time. The hypothesis was that residents in neighborhoods with high social affluence, high neighborhood advantage and high residential stability compared to residents in neighborhoods with two or fewer of these features present would be more likely to have a pattern of persistent depressive symptoms than a pattern of few or no depressive symptoms. Demonstrating a relationship between features of neighborhood social environment and patterns of depressive symptoms among persons with type 2 DM will set the stage for interventions targeting resources for persons and neighborhoods most at risk for poor health.

Methods

Recruitment Procedures

Three primary care practices in Philadelphia, Pennsylvania were used to recruit patients. The three urban primary care practices were similar in respect to the types and experience of providers in the practice and in the geographic regions they served. Patients were identified through the electronic medical record with a diagnosis of type 2 DM, a prescription for an oral hypoglycemic agent within the past year, and a prescription for an oral antidepressant within the past year during the period April 2010 to April 2011. All patients identified with an upcoming appointment were approached for further screening. The inclusion criteria were: 1) aged 30 years and older; 2) a diagnosis of type 2 DM and a current prescription for an oral hypoglycemic agent; and 3) a current prescription for an antidepressant. Exclusion criteria were: 1) inability to give informed consent; 2) significant cognitive impairment at

baseline (Mini-Mental State Examination (MMSE) <21) (Crum, Anthony, Bassett, & Folstein, 1993); 3) residence in a care facility that provides medications on schedule; and 4) unwillingness or inability to use the Medication Event Monitoring System (MEMS). The study was a randomized controlled trial designed to assess whether an intervention in primary care improved glucose control and depressive symptoms in type 2 DM patients. Patients were randomly assigned to the integrated care intervention or usual care. Patients received a token of appreciation and transportation expenses for participation in the study. The details of the study design are available elsewhere (Bogner, Morales, de Vries, & Cappola, 2012). The study protocol was approved by the University of Pennsylvania, Perelman School of Medicine Institutional Review Board and all patients gave written and informed consent.

Measurement Strategy

In order to obtain information on age, self-reported ethnicity, gender, marital status, and education participants were asked the following questions: "What is your date of birth?"; "Which of the following best describes you: white, black/African American, Asian/pacific islander, Hispanic/Spanish, native American/Alaskan, other, or don't know?"; "Are you male or female?"; "What is your current marital status: married/partnered, separated/divorced, never married, or widowed?"; and "What is your highest grade or year of school completed?" Functional status was measured using the Medical Outcomes Study Short Form (SF-36) (Stewart, Hays, & Ware, 1988). Medical comorbidity was assessed by self-report at baseline. Cognitive status was measured using the MMSE, a short standardized mental status examination widely employed for clinical and research purposes (Folstein, Folstein, & McHugh, 1975).

Depression

Depressive symptoms were measured using the nine-item Patient Health Questionnaire (PHQ-9) at baseline and 12 weeks. The PHQ-9 is a self-administered version of the PRIME-MD diagnostic instrument for common mental disorders. The PHQ-9 depression module, which scores each of the 9 DSM-IV criteria as "0" (not at all) to "3" (nearly every day), is a reliable tool for screening and monitoring designed for primary care settings (Kroenke, Spitzer, & Williams, 2001; Kroenke, Spitzer, Williams, & Lowe, 2010). Depression remission is defined by a PHQ-9 score less than 5 (Kroenke et al., 2001). Remission, defined as an almost asymptomatic state, is a critical clinical goal in the care of depression. The PHQ-9 retains its sensitivity and validity among patients with co-morbid depression and diabetes (Lloyd, 2002). Patients were sorted into one of four groups based on their pattern of PHQ-9 scores assessed at baseline and 12-week follow up. Grouped in this way, patients were considered to have persistent depressive symptoms if their PHQ-9 scores were greater than or equal to 5 at both interviews, new depressive symptoms if their PHQ-9 scores were less than 5 at baseline and greater than or equal to 5 at follow-up, remitted depressive symptoms if their PHQ-9 scores were greater than or equal to 5 at baseline and less than 5 at follow-up, and no or few depressive symptoms if their PHQ-9 scores were less than 5 at both interviews.

Neighborhood Social Environment

Individual patient residential addresses were geo-coded at the Census tract level. Consistent with Sampson et al. and others (Boardman, 2004; Brusilovskiy & Salzer, 2012; Long, Field, Armstrong, Chang, & Metlay, 2010; Matthews & Yang, 2010; Sampson et al., 1997; Yang et al., 2011), factor analysis was performed on 13 variables extracted from 2010 tract-level Census data to assess key constructs of the neighborhood social environment: social affluence, neighborhood advantage and residential stability. To examine the nature of the relationships between variables, factor analysis identifies the smallest number of factors explaining composites of the observed variables. Variables were required to be loaded above 0.55 on a single factor to decrease collinearity between resulting factors. Three single composite factors/variables emerged from the analysis with all 13 variables loading above 0.55 on single factor. These three identified factors were also confirmed through conventional diagnostics, such as scree plots. These factors represented constructs of neighborhood social environment: social affluence, neighborhood advantage, and residential stability. Social affluence was derived from five variables: percent of households with resident/room ratio greater than 1 (factor loading = 0.57), percent of female-headed households (0.84), percent unemployed (0.77), percent of people below the poverty line (0.87), and percent of people receiving public assistance (0.73). Neighborhood advantage was derived from three variables: percent of residents with at least a bachelor's degree (0.87), percent of people in professional occupations (0.75), and percent of people with a household income greater than \$75,000 (0.67). Lastly, residential stability was derived from two variables: the percent of house owners (0.86) and the percent of residents living at the same address over 5 years (0.86). Based on the sample median, factor scores for neighborhood social environment (social affluence, neighborhood advantage and residential stability) were dichotomized as high or low.

Study Sample

A total of 715 patients were identified by electronic medical records. In all, 265 were eligible and were approached, and 190 were enrolled (71.7% participation rate). Patients who participated and patients who refused were similar in age, gender, and ethnicity. The study sample included 179 patients who completed the final study visit and had complete information on neighborhood social characteristics.

Analysis

The analytic plan proceeded in two phases. The first phase consisted of calculating descriptive statistics for the patients according to pattern of depressive symptoms and the appropriate means and frequencies for each variable. Comparisons between groups of patients were made using χ^2 for binary variables and analysis of variance (ANOVA) for continuous variables for categorical or continuous data, respectively. The second phase consisted of using multivariable logistic regression models to examine the relationship of neighborhood social characteristics with the pattern of depressive symptoms at baseline and 12-week follow up. Individual patient data was combined with neighborhood social environment data derived from factor analysis. Neighborhood social characteristics was the independent variable in the analysis and patients in neighborhoods with high social

affluence, high residential stability, and high neighborhood advantage were compared to patients in neighborhoods that had two or fewer high features. The dependent variable and primary outcome was pattern of depressive symptoms (persistent depressive symptoms, new depressive symptoms, remitted depressive symptoms, and no or few depressive symptoms) between baseline and 12-week follow up with no or few depressive symptoms as the reference group. All multivariable models were adjusted for age, ethnicity, gender, educational attainment, number of medical conditions, cognitive status, intervention condition, and physical functioning by including them in the final models. The measure of association was the odds ratio. Recognizing that tests of statistical significance are approximations that serve as aids to inference, α was set at 0.05. The analyses were conducted in STATA version 12 for Windows (STATA Corporation, College Station, TX).

Conflicts of Interest

The authors report no conflicts of interest, and all authors certify responsibility for this manuscript.

Results

Study sample

The mean age of the sample was 57.4 years (standard deviation (s.d.) 9.5 years). In all, 121 (67.6%) of the patients were women, 69 persons (38.6%) were married, and 29 persons (16.2%) had less than a high school education. The self-identified ethnicity of patients was 65 white (36.3%), 101 African-American (56.4%), 7 Hispanic (3.9%), and 6 (3.4%) who self-identified as 'other.' The mean number of medical conditions was 7.3 (s.d. 2.4) and the mean MMSE score was 28.2 (s.d. 2.3). Sociodemographic characteristics, health status, cognitive status, and depression were compared across patterns of depressive symptoms (Table 1). Age in years, number of medical conditions, physical functioning SF-36 scores and mini-mental state examination (MMSE) scores significantly differed by patterns of depressive symptoms ($p < .05$).

Pattern of depressive symptoms

Figure 2 shows the patterns of depressive symptoms represented by the mean observed PHQ-9 scores at baseline and the 12-week follow up. The first pattern represents persons who report a high level of depression symptoms at baseline and have a persistent course ("persistent depressive symptoms"; $n = 42$, 23.5% of the sample). Patients with persistent depressive symptoms had a mean PHQ-9 at baseline of 10.3 and a mean PHQ-9 at the 12-week follow up of 12.7. The second pattern represents persons who report no or few depressive symptoms at baseline and high level of depression symptoms at the 12-week follow up ("new depressive symptoms"; $n = 39$, 21.8% of the sample). Patients with new depressive symptoms had a mean PHQ-9 score of 1.7 at baseline and a mean PHQ-9 at the 12-week follow up of 8.7. The third pattern represents persons who report a high level of depression symptoms at baseline and no or few depressive symptoms at the 12-week follow up ("remitted depressive symptoms"; $n = 85$, 47.5% of the sample). Patients with remitted depressive symptoms had a mean PHQ-9 score of 15.3 at baseline and a mean PHQ-9 at the 12-week follow up of 1.9. Patients in the fourth pattern report no or few depression

symptoms at baseline and at the 12-week follow up. These patients were designated as having “no or few depressive symptoms” (n=13, 7.3% of the sample). Patients with no or few depression symptoms had a mean PHQ-9 score of 2.9 at baseline and a mean PHQ-9 at the 12-week follow up of 1.0.

Neighborhood social environment (residential stability, social affluence, and neighborhood advantage) and patterns of depressive symptoms

The relationship between composite neighborhood characteristics and patterns of depressive symptoms was examined (Table 2). Patients in neighborhoods with high social affluence, high residential stability, and high neighborhood advantage compared to patients in neighborhoods that had two or fewer high features, were much less likely to have a persistent pattern of depressive symptoms compared a pattern of few or no depressive symptoms (odds ratio (OR) = 0.16, 95% confidence interval (CI) [0.04, 0.66]). These findings remained significant in the final model even after adjusting for age, ethnicity, gender, educational attainment, number of medical conditions, cognitive status, intervention condition, and physical functioning (adjusted OR = 0.06, 95% CI [0.01, 0.36]). In addition, after adjustment for potentially influential covariates, patients in neighborhoods with high social affluence, high residential stability, and high neighborhood advantage compared to patients in neighborhoods that had two or fewer high features, were also less likely to have a new pattern of depressive symptoms compared to a pattern of few or no depressive symptoms (adjusted OR = 0.13, 95% CI [0.02, 0.75]).

Discussion

The principal finding of this study is that patients in neighborhoods with high social affluence, high residential stability, and high neighborhood advantage were much less likely to have a pattern of persistent depressive symptoms compared to a pattern of few or no depressive symptoms. This finding held after adjustment for potentially influential covariates. This study provides compelling evidence, then, that features of neighborhood social environment may be important contributors to patterns of depressive symptoms among patients with type 2 DM. Specifically, this study suggests that living in favorable neighborhood social environments may reduce risk for persistent and new depressive symptoms among patients with type 2 DM and a current prescription for an antidepressant.

Before discussing the implications based on findings from this study, the results should be considered in the context of several potential study limitations. First, data was collected from three primary care sites whose patients may not be representative of other primary care practices. However, the practices were probably similar to other primary care practices in the region as they were diverse and varied in size. It should also be noted that data collection occurred during difficult economic conditions in the United States. Second, patients lived in urban and suburban areas and so the results may not be representative of rural areas. In addition, two-thirds of the study sample consisted of women so the results may not be representative of men. Third, the role of the social neighborhood environment on patterns of depressive symptoms was the sole focus of this examination. Future research could incorporate other measures of neighborhood environment (e.g. physical environment, built

environment, local food environment, social capital) as well as individual factors (physical health, psychosocial stress, and psychosocial resources) and health outcomes in order to further understand the pathways linking neighborhoods to health across time (Kim, 2008). Fourth, the study did not adjust for income, but did adjust for education (Muller, 2002). Education has been used as a proxy for individual SES. Fifth, information on other patient characteristics such length of antidepressant treatment and other medications that may increase risk of depression was not available. Sixth, the utilization of an administrative definition of neighborhoods (census tracts) may not be the most meaningful level of aggregation. It is possible that assessment within a more respondent-derived neighborhood context may elicit the greatest explanatory power in understanding the role of neighborhood environment (Diez Roux, 2001). Seventh, the study does not examine potential mechanisms underlying the relationship between neighborhoods and patterns of depressive symptoms. The exact mechanism by which neighborhoods may affect the course of depressive symptoms is unknown. The potential mediators between neighborhoods and patterns of depressive symptoms require further study. Finally, the temporal relationship between neighborhood social environment and depressive symptoms remains a subject of inquiry as depression could plausibly lead to movement into and creation of neighborhoods that have less favorable social environments. However, prior evidence demonstrates a temporal relationship between neighborhood environment and the onset of depression (Cutrona et al., 2005; Galea et al., 2007) and the findings support this framework.

Despite these limitations, the results are important to consider given that it is one of the first studies examine the relationship between neighborhood social environment and depressive symptoms in patients with type 2 DM. While a growing body of literature has linked neighborhood social environment and depressive symptoms (Julien et al., 2012; Kim, 2008; Mair et al., 2008), little research has examined this relationship in patients with type 2 DM. Only one other study was found that looked at the relationship between neighborhood social environment and depressive symptoms in patients with type 2 DM (Gary-Webb et al., 2011). This previous study was limited by its cross-sectional design and relatively homogenous study population. This work builds on previous work by examining the longitudinal relationship between neighborhood social environment and depressive symptoms in patients with type 2 DM, thereby providing insight into the relationship between neighborhood social environment and depressive symptoms over time. In addition, inclusion criteria were structured to include as many persons who were able to participate as possible, therefore making the results highly applicable to real world settings.

The examination of neighborhood social environment in relation to depressive symptoms in the context of type 2 DM is particularly important given the common and deleterious interplay between these conditions. Diabetes and depression are two of the most common problems seen in primary care settings. Co-morbid depression and diabetes result in poor adherence to medication and dietary regimens, poor glycemic control, reduced quality of life, and increased health care expenditures (de Vries McClintock, Morales, Small, & Bogner, 2014; Lustman & Clouse, 2005). Depression has been specifically linked to prognostic variables in diabetes such as micro- and macro-vascular complications (de Groot et al., 2001) as well as increased risk of mortality (Black, Markides, & Ray, 2003; Egede, Nietert, & Zheng, 2005; Katon et al., 2005; Zhang et al., 2005). The health services

implications, morbidity, and mortality resulting from co-morbid depression and diabetes demonstrate the enormous public health significance as well as the urgency to finding evidence-based solutions to reduce the burden of these conditions (Carter et al., 2000; Gallo et al., 2005; Lopez, Mathers, Ezzati, Jamison, & Murray, 2006).

This study also suggests that living in favorable neighborhood social environments may reduce risk for new depressive symptoms among patients with type 2 DM and pre-existing depression. Of note, the relationship between neighborhood social environment and new depressive symptoms reached standard levels of statistical significance after adjusting for potentially influential covariates. Adjustment of the odds ratio for imbalance in the distribution of baseline covariates assessed at baseline can be expected to yield estimates closer to the true estimate of the effect (Buyse, 1989; Lu et al., 2005). This study adds to the evidence that a patient's social environment influences the development of depressive symptoms and therefore may contribute to suboptimal clinical outcomes. Unfortunately, contextual factors related to neighborhood social environment are rarely addressed or incorporated into patients' treatment plans.

Approaching depression treatment and care from a multi-level contextual framework that takes both individual and neighborhood level factors into account may be necessary to improve depression outcomes in persons with type 2 DM. With the shift in focus of the U.S. health care system from acute care to chronic disease (Committee on Crossing the Quality Chasm: Adaptation to Mental Health and Addictive Disorders, 2006; Institute of Medicine, 2001), the various elements of redesigned practice have crystallized around the chronic care model (the Wagner model (Von Korff, Gruman, Schaefer, Curry, & Wagner, 1997; Wagner, Austin, & Von Korff, 1996)). Community resources remain the least developed component of this model (Pearson et al., 2005), perhaps because they have been under-resourced. Interventions need to be designed for primary care patients living in unfavorable neighborhood environments with depressive symptoms and type 2 DM. There is a need to better integrate community resources into primary care, and this has enormous potential for public health impact.

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Figure 1.

Conceptual framework relating neighborhood and individual characteristics to patterns of depressive symptoms among primary care patients with type 2 diabetes mellitus. Adapted from Kim (2008).

Figure 2. Mean observed nine-item Patient Health Questionnaire (PHQ-9) across time stratified on the four patterns of depressive symptoms (n=179).

Table 1

Baseline patient characteristics according to patterns of depressive symptoms (n=179).

Sociodemographic characteristics	Persistent depressive symptoms (n=42)	New depressive symptoms (n=39)	Remitted depressive symptoms (n=85)	No or few depressive symptoms (n=13)	P-value
Age, mean in years (s.d.)	58.9 (7.9)	60.3 (7.9)	56.0 (10.3)	57.0 (11.4)	.04
White, n (%)	15 (35.7)	14 (35.9)	30 (35.3)	6 (46.15)	.90
Gender, women n (%)	31 (73.81)	27 (69.23)	56 (65.88)	7 (53.85)	.57
Married, n (%)	15 (35.71)	19 (48.72)	31 (36.47)	4 (30.77)	.51
Less than HS education, n (%)	8 (19.05)	4 (10.26)	13 (15.29)	4 (30.77)	.34
Health status					
Medical conditions, mean (s.d.)	6.81 (2.68)	5.80 (2.05)	8.22 (3.37)	7.31 (4.96)	<.01
Physical functioning, mean (s.d.)	54.05 (28.27)	73.08 (24.99)	40.77 (24.99)	61.54 (33.13)	<.01
Cognitive status					
MMSE, mean (s.d.)	28.04 (2.42)	28.8 (1.72)	27.77 (2.42)	29.0 (1.73)	.03

Abbreviations: s.d., standard deviation; HS, high school; SF-36, Medical Outcomes Study Short Form; MMSE, Mini-Mental State Examination; PHQ-9, nine-item Patient Health Questionnaire;

Persistent depressive symptoms indicates PHQ-9 ≥ 5 at baseline and 12-week follow up.

New depressive symptoms indicates PHQ-9 < 5 at baseline and PHQ-9 ≥ 5 at 12-week follow up.

Remitted depressive symptoms indicates PHQ-9 ≥ 5 at baseline and PHQ-9 < 5 at 12-week follow up.

No or few depressive symptoms indicates PHQ-9 < 5 at baseline and 12-week follow up.

P-values represent comparisons according to χ^2 for binary variables and analysis of variance (ANOVA) for continuous variables for categorical or continuous data, respectively.

Table 2

Patterns of depressive symptoms at follow-up according to following neighborhood social environment: high social affluence, high neighborhood advantage, and high residential stability (reference: two or fewer high features present) (n= 179).

Patterns of depressive symptoms	Baseline interview	Follow-up interview	Crude OR [95% CI]	Adjusted OR [95% CI]
Persistent depressive symptoms	+	+	0.16 [0.04, 0.66]	0.06 [0.01, 0.36]
New depressive symptoms	-	+	0.52 [0.14, 1.87]	0.13 [0.02, 0.75]
Remitted depressive symptoms	+	-	0.31 [0.09, 1.05]	0.27 [0.06, 1.36]
No or few depressive symptoms	-	-	1.00	1.00

Note: OR = odds ratio; CI = confidence interval

A "+" sign indicates the nine-item Patient Health Questionnaire (PHQ-9) 5.

A "-" sign indicates the PHQ-9 < 5.

Adjusted for age, ethnicity, gender, educational attainment, number of medical conditions, cognitive status, intervention condition, and physical functioning.