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DEPRESSION AND DIABETES AMONG LOW-INCOME HISPANICS: DESIGN ELEMENTS OF A SOCIO-CULTURALLY ADAPTED COLLABORATIVE CARE MODEL RANDOMIZED CONTROLLED TRIAL *

KATHLEEN ELL, DSW,

University of Southern California, Los Angeles

WAYNE KATON, MD,

University of Washington

LEOPOLDO J. CABASSA, PhD,

New York State Psychiatric Institute

BIN XIE, PhD,

University of Southern California, Los Angeles

PEY-JIUAN LEE, MS,

University of Southern California, Los Angeles

SUAD KAPETANOVIC, MD, and

University of Southern California, Los Angeles

JEFFRY GUTERMAN, MD, MS

University of Southern California, Los Angeles, and Los Angeles County Department of Health Services

Abstract

Objective—This article describes design elements of the Multifaceted Depression and Diabetes Program (MDDP) randomized clinical trial. The MDDP trial hypothesizes that a socioculturally adapted collaborative care depression management intervention will reduce depressive symptoms and improve patient adherence to diabetes self-care regimens, glycemic control, and quality-of-life. In addition, baseline data of 387 low-income, 96% Hispanic, enrolled patients with major depression and diabetes are examined to identify study population characteristics consistent with trial design adaptations.

Methods—The PHQ-9 depression scale was used to identify patients meeting criteria for major depressive disorder (1 cardinal depression symptom + a PHQ-9 score of ≥ 10) from two community safety net clinics. Design elements included sociocultural adaptations in recruitment and efforts to reduce attrition and collaborative depression care management.

Results—Of 1,803 diabetes patients screened, 30.2% met criteria for major depressive disorder. Of 387 patients enrolled in the clinical trial, 98% had Type 2 diabetes, and 83% had glycated hemoglobin (HbA1c) levels $\geq 7\%$. Study recruitment rates and baseline data analyses identified

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Direct reprint requests to: Kathleen Ell, DSW, School of Social Work, MRF 102R (MC 0411), University of Southern California, Los Angeles, CA 90089-0411, ell@usc.edu.

socioeconomic and clinical factors that support trial design and intervention adaptations. Depression severity was significantly associated with diabetes complications, medical comorbidity, greater anxiety, dysthymia, financial worries, social stress, and poorer quality-of-life.

Conclusion—Low-income Hispanic patients with diabetes experience high prevalence of depressive disorder and depression severity is associated with socioeconomic stressors and clinical severity. Improving depression care management among Hispanic patients in public sector clinics should include intervention components that address self-care of diabetes and socioeconomic stressors.

Keywords

depression; diabetes; randomized clinical trial; collaborative care; low-income

INTRODUCTION

Among U.S. Hispanics, the prevalence of diabetes is nearly twice that among non-Hispanic whites, and diabetes is the fifth leading cause of death [1, 2]. Glycemic control is worse [3], and complications are higher than for any other ethnic group, except for Native Americans [4, 5]. Poor diabetes outcomes in Hispanics are explained, in part, by inadequate medical and self-care, as well as sociocultural factors [6, 7]. Prevalence estimates indicate that diabetes is associated with a twofold higher risk of comorbid depression compared to the general population, with rates among Hispanics as high as 33% [8–10].

Comorbid depression and diabetes may significantly worsen the course of both disorders, leading to increased socioeconomic stress, reduced functioning and quality of life, and higher complication and mortality rates [11–18]. Total health care expenditures among patients with diabetes and depression are up to 4.5 times higher than for non-depressed patients [19–21]. Depression may worsen diabetes outcomes via behavioral and biochemical mechanisms [22–24], and may decrease patients' adherence to self-care regimens such as diet, exercise, checking blood glucose, and medication adherence [25–27]. Patients with diabetes and comorbid depression have been shown to have decreased glucose tolerance and increased insulin resistance, possibly mediated by alterations in catecholamine and serotonin pathways [28, 29]. In some but not all trials, glucose control is shown to improve with effective depression treatment [30, 31]. Greater risk of cardiovascular illness, functional disability, mortality, and health service use is found among depressed Hispanics with diabetes [22]. Among diabetic patients, depression can be persistent and severe [13, 26, 30]. Unfortunately, Hispanics are less likely to receive guideline congruent depression care [23, 24], and are at higher risk of discontinuing antidepressants during the first 30 days of treatment because of side effects or socioeconomic barriers [32].

This article: a) describes design elements of the Multifaceted Depression and Diabetes Program (MDDP) randomized clinical trial with a focus on sociocultural adaptations in recruitment, attrition management, and collaborative depression care management; and b) examines baseline data from 387 low-income, 96% Hispanic patients with major depression and diabetes to identify study population and care system characteristics that support the study design adaptations. The MDDP trial hypothesizes that reducing depressive symptoms will improve patient adherence to diabetes self-care regimens, glycemic control, and quality of life. The trial is designed to examine potential differences in study outcomes by clinic site. Clinic administrative leadership and clinical staff were engaged in designing aspects of trial implementation that best fit the needs of clinic organization and provider preferences.

METHODS

Study Site, Sample Recruitment, and Depression Screening

The study was approved by the University of Southern California–Health Sciences Institutional Review Board and conducted at two Los Angeles County Department of Health Services safety net clinics. One clinic offers a diabetes management program, with diabetes nurse educators providing care coordination, remote monitoring, telephonic communication, and patient self-management education and empowerment. Via clinic chart review, trained bilingual study recruiters identified diabetes patients. Patients provide brief verbal consent to be screened for depressive symptoms and eligible patients provide written informed consent. Randomization is determined via computer generated number from a uniform distribution (Enhanced Usual Care (EUC) = 0.5; Intervention > 0.5), printed on a sheet of paper, and sealed in an envelope from which patients select one of five after baseline interview.

EUC patients receive standard clinic care and are given a patient/family focused depression educational pamphlet (Spanish or English) and a community, financial, social services, transportation, and child care resource list. EUC primary care physicians (PCPs) may prescribe antidepressants (AM) or refer patients for mental health care. Patients may seek any usually available mental health treatment. The treating PCP was informed of patients' study participation. Clinic PCPs and nursing staff attended a depression treatment didactic session by the study psychiatrist at the beginning of the study and a refresher midway.

Sociocultural Framework

A guiding conceptual framework (Figure 1) assumed that patients' health beliefs and treatment behaviors are culturally informed (with significant variation in beliefs within and across cultural groups and that these beliefs are key antecedents of health behaviors), and that culturally patterned behavior is not independent of powerful structural constraints and social contextual factors, including cost and provider concerns relevant to safety net clinics, patient literacy, and access to supportive resources. Thus, adaptations to the study design and intervention were made to accommodate needs of the trial population and to adapt to the public sector organizational practice context (Table 1). These adaptations are aimed to:

1. maximize recruitment and minimize attrition;
2. enhance patient depression treatment engagement and adherence;
3. reduce individual, provider, and system barriers to depression and diabetes care via the provision of system and community resource navigation;
4. integrate depression and diabetes care; and
5. provide culturally and linguistically competent depression care.

Where feasible, data collection measures address elements presented in Figure 1. With respect to knowledge, attitudes, and beliefs regarding depression, we conducted a qualitative study of 19 patients that included focus groups and individual structured interviews [33].

The Patient Health Questionnaire depression scale (PHQ-9) was used to screen patients because it provides both a dichotomous diagnosis of major depression and a continuous severity score [34], measures a common concept of depression across racial and ethnic groups [35], and believed to be practically feasible and sustainable in real world community clinics. The PHQ-9 is a reliable depression screening tool in primary care with a demonstrated ability to identify clinical depression, make accurate diagnoses of major depressive disorder, track severity of depression over time [36–41], and monitor patient response to therapy in-person or via telephone [42]. The PHQ-9 scores the nine DSM-IV

criteria as “0” (not at all) to “3” (nearly every day), with possible scores ranging from 0 to 27, with cut points of 5, 10, 15, and 20 representing the thresholds for minor, mild, moderate, and severe depressive disorder. If patients meet criteria for major depressive disorder (based on a score of ≥ 2 for one of the two cardinal depression symptoms and a PHQ-9 score of ≥ 10), a screening protocol is administered to exclude patients with current suicidal ideation, a score of 8 or greater on the AUDIT alcohol assessment [43], and recent use of lithium or antipsychotic medication.

Data Collection

The 20-item SCL-90 depression scale [44] is used as a reliable and valid measure of distress in medical populations shown to be sensitive to change in primary care studies (Cronbach alpha (α) = 0.91) [45, 46]. Two standard questions from the SCID are used to assess dysthymia [47]. The Summary of Diabetes Self-Care Activities Questionnaire was used to measure self-reported adherence (α = 0.72) [48]. Diabetes symptoms are assessed via self-report using the Whitty 9-item questionnaire, demonstrated to measure change over time with effective diabetes treatment (α = 0.79) [49]. Self-reported diabetes complications, comorbid illness, and socioeconomic stress are also assessed. Chronic Pain defined as pain present most of the time for 6 or more months over past year is assessed using a measure developed for diabetes patients [50]. Anxiety is assessed using a 6-item BSI anxiety module from the Brief Symptom Inventory (BSI; α = 0.85) [51]. Socioeconomic stress is assessed using 12 items from the Hispanic Stress Inventory [52] (unemployment problems, marital/family conflicts, legal problems, caregiving problems, worries about community violence) plus questions regarding specific financial stress including difficulty in paying bills.

Glycated hemoglobin (HbA1c) results (last test prior to enrollment) are abstracted from medical charts. The MOS Short-Form Health Survey (SF-12) [53] is used to assess functioning. Disability is assessed using the Sheehan Disability Scale (SDS) adapted for depression trials [54]. Scores are derived as an average of a 10-point Likert Scale (10 indicating inability to carry out work and social roles; α = 0.88).

Patient Treatment Choice and Depression Education

Based on previous studies suggesting that the low-income, predominantly Hispanic population is likely to initially prefer psychotherapy [33, 55–57], we elected to give patients the choice of first-line treatment: Problem Solving Therapy (PST) [58] alone, AM alone, or both PST and AM. All patients are educated about the different treatment options. The initial Diabetes Depression Clinical Specialist (DDCS) visit(s) includes: a semi-structured psychiatric/psychosocial assessment; patient depression, PST, and AM education; initial treatment choice consideration; patient navigation assistance; and includes family members at patient request. Subsequent visits provide PST and/or telephone AM monitoring.

Collaborative Depression Care Management

MDDP care management adapted evidence-based components of the collaborative care model [30, 31] including:

1. DDCS (bilingual master's degreed social workers) depression education and general psychosocial assessment, bi-monthly PST and AM monitoring over 4 months, and patient navigator (PN) supervision;
2. study psychiatrist weekly clinical supervision of the DDCS that included DDCS review of patient's depression status (using the PHQ-9), diabetes, and other comorbid clinical status, all current medications, and patient treatment preference;

3. study psychiatrist recommended AM and dosage and additional psycho-tropic medications such as an anti-anxiety agent or sedative-hypnotic that was communicated by the DDCS to the PCP; and
4. psychiatrist availability to the DDCS and PCP via pager.

MDDP applies a written personalized structured algorithm for stepped care management (based on the IMPACT algorithm for depression in primary care) [31] to ensure patients receive depression treatment consistent with their clinical presentations and responses over time. For example, for a patient who has not had full response to treatment by 4–8 weeks, Step 2 of the algorithm is employed. The patient on AM may require medication change or augmentation or adding PST. Patients on PST alone are again educated about the option of AM and based on discussion between the study psychiatrist and the DDCS, an AM is recommended by the psychiatrist and communicated to the PCP. The patient, who has not had a full response by 8–12 weeks, proceeds to Step 3. During the weekly DDCS/psychiatrist meeting, the psychiatrist recommends either another type of AM, a combination of PST and AM if not tried at Step 2, or referral for treatment in a specialty mental health setting, facilitated by the DDCS. Treatment at this step depends on clinical status, available community resources, and patients' willingness to accept recommended care.

Psychotherapy

PST was chosen because it has been effective in diabetes patients [40, 41] and in studies with Hispanic low-income cancer patients [57, 59, 60]. PST's brief psycho-educational characteristics make it feasible to provide and acceptable to patients with less education. PST uses the behavioral activation components of CBT, but with less emphasis on changing cognition and greater emphasis on patient assessment of personal contextual problems and skill-building to enhance self-management skills. PST sessions ranging from 6–12 weeks are highly structured. The perception of counselor as teacher or coach in PST is compatible with preferences of Hispanic patients, particularly when therapists are sensitive to the desire for warmth and sensitivity to family relationships. The saliency of social and environmental stressors in Hispanics' explanatory models of depression and the congruency of psychotherapy with the cultural value of *desahogarse* (unburdening oneself) also makes PST an appropriate treatment option for this underserved population [33]. PST implementation was specifically adapted in areas suggested by Bernal and colleagues [61], such as use of language and idioms in educational and homework materials, utilizing bilingual and bicultural staff, use of cultural common sayings (*dichos*) and idiomatic language in treatment sessions, recognition and knowledge of cultural values (e.g., familism, respect), adaptation of treatment concepts to be sensitive and consistent with culture and patient context, sensitivity of intervention staff to adaptive values of patient culture such as spirituality, use of patient preferences and integration of diabetes self-management in the problem-solving focus, consideration of patient's health status in the context of socioeconomic factors, and ongoing assessment of need for PN services, including facilitating patient/PCP communication.

Acute Treatment Follow-Up

After completion of the acute phase of treatment, the patient is followed with a program to maximize maintenance treatment and prevent relapse. This includes DDCS telephone maintenance/relapse prevention and outcomes monitoring [62], community services navigation by the DDCS or PN under DDCS direction, and a maintenance open-ended PST support group in both English and Spanish. The DDCS contacts the patient monthly via telephone up to 12 months after treatment initiation to monitor depressive symptoms, provide behavioral activation support for engaging in pleasant activities and motivational support for ongoing use of PST skills and medication adherence, and invites patients to

attend an open-ended PST support group. If patients report symptom relapse, the DDCS will present to the psychiatrist during the weekly supervision call. If indicated, additional PST sessions are provided and/or AM adjusted by the PCP as recommended by the psychiatrist.

DDCS Training

The DDCS received an initial didactic orientation to the needs and psychiatric and general psychosocial evaluation (such as domestic violence and family economic and care-giving problems) of low-income patients with diabetes, biologic aspects of depression, and AM use for diabetic patients from the study psychiatrist and principal investigator. The DDCS received an initial 2 weeks of formal PST training including: self-study of the PST and MDDP manuals, video, and in-person didactic sessions; observation of a skilled therapist doing an initial evaluation and two PST sessions with a diabetes patient; and treatment of 3–5 patients under close supervision by a therapist experienced in PST. Audio-taping of treatment sessions was conducted on five patients; these were reviewed by a PST expert using a Likert scale of 1 to 3 (low to high adherence) on 12 session-specific items. If there is evidence of inadequacy, further consultation and supervision is provided. Cultural competency training was provided for both the DDCS and the PN via a self-study manual.

Patient Navigators

PNs worked with patients under the direction of the DDCS to assist in referrals to community resources (e.g., housing, social services), locate patients who had missed clinic appointments, and facilitate clinic system and patient communication about appointments and maintain up-to-date community resource information. PN training included cultural competency, meeting of clinic staff and learning about clinic management and processes, and community resource and eligibility requirements.

RESULTS

At recruitment completion (August 2005–July 2007), of 1,803 diabetes patients, 1,729 (95.8%) were successfully screened including 1,255 (72.6%) females and 474 (27.4%) males (Figure 2). Of patients screened, 412 women and 111 men met criteria for major depressive disorder (32.8% vs 23.4%, $p < 0.001$). Table 2 presents patient characteristics. In Table 3, clinical site differences were observed, in which significantly more patients at Roybal were taking insulin, had HbA1c levels $\geq 7.0\%$, reported taking psychotropic medications or receiving counseling, and had lower PHQ-9 scores. Table 4 includes results from multiple Logistic Regressions comparing odds of having moderate to severe major depression across socioeconomic, clinical, and functional characteristics with adjustment for study site, birth place, language use, age, and gender. Major depression severity was significantly associated with number of diabetes complications, medical comorbidity, greater anxiety, dysthymia, worry about medication cost and financial situation, social stress, and poorer quality of life indices.

Qualitative study results found that patients perceived depression as a serious condition linked to the accumulation of social stressors. Somatic and anxiety-like symptoms and the cultural idiom of *nervios* were central themes in low-income Hispanics' explanatory models of depression. The perceived reciprocal relationships between diabetes and depression highlighted the multiple pathways by which these two illnesses impact each other and support the integration of diabetes and depression treatments. Concerns about depression treatments included fears about the addictive and harmful properties of antidepressants, worries about taking too many pills, and the stigma attached to taking psycho-tropic medications.

DISCUSSION

Baseline data underscore a high prevalence of major depressive disorder, but also lack of adequate treatment, highlighting the need to improve depression care management among low-income Hispanics with diabetes. The high degree of socioeconomic stress reported at baseline and its association with depression severity [33, 63] and the importance of environmental stress to patients found in our qualitative study highlight the importance of providing patient navigation and integrating socioeconomic stress and care barrier management in treating depression among low-income Hispanics. Baseline clinic site differences in receipt of depression care and HbA1c data may be attributable to the availability of diabetes nurse care management and education in one site. Trial depression outcome analyses will provide the opportunity to examine whether the trial intervention model reduces these differences.

Only one-fifth of study participants meeting criteria for MDD reported already receiving either counseling or AM suggesting that patients were not routinely screened for depression and that case finding is indicated. However, ongoing depressive symptoms among those treated could be attributable to treatment adherence (possibly due to lack of responsiveness to patient treatment preference), unaddressed economic and social stress (medication cost concern was independently associated with depression severity), and/or provider failure to monitor depressive symptoms over time and provide maintenance and relapse prevention treatment as indicated. Collaborative care approaches that use individualized stepped care algorithms to address individual patient's treatment preferences and response and provide ongoing symptom monitoring and relapse prevention are likely to be more effective [64, 65].

Adaptations to MDDP were guided by the assumption that the delivery of quality improvements to diabetes and depression care for low-income populations in safety net clinics must consider potential interactions between economic and sociocultural factors, patient, provider, health care system needs, and clinical pathways characterizing the association between depressive symptoms and diabetes (66, 67). MDDP adaptations aimed to:

1. maximize recruitment and minimize attrition;
2. enhance patient engagement and adherence;
3. reduce patient, provider, and system barriers to depression and diabetes care via the provision of patient navigation;
4. integrate depression and diabetes care; and
5. provide culturally and linguistically competent depression care.

Active participation by clinic providers and organizational leadership in the design and implementation of the trial is consistent with current recognition of the need to conduct community based translational science.

Study limitations include that results may not be generalizable to more acculturated Hispanic patients as our sample was primarily composed of foreign-born, Spanish-speaking, Mexican immigrants and that the sample was primarily female. Study sites may not represent other urban or rural primary care clinics. Future studies testing collaborative care within different care systems and with culturally diverse populations providing intervention elements that are dictated by patient and care system characteristics are needed.

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Figure 1.
Sociocultural factors and barriers in depression care management for low-income Hispanics with diabetes.

Figure 2.
MDDP recruitment flowchart.

Table 1**Study Design and Intervention Adaptations**

Recruitment and Attrition Adaptations	<ul style="list-style-type: none"> • Recruitment from community-based public primary care clinics • Use of Spanish-speaking recruiters and study interviewers • Telephone data collection • Flexible scheduling of outcome interviews, including evening and weekend hours • Study and intervention materials adapted for literacy, idiomatic, and cultural content • Multiple (including evening and weekend) attempts to reach patient by study recruiters and interviewers • Patient reimbursement for completing outcome interviews • Transportation expenses covered when need indicated.
Provider and System Level Adaptations	<ul style="list-style-type: none"> • Use of bilingual therapists with a master's degree in social work as Depression Diabetes Care Specialist (DDCS) • Brief training in cultural competency to all intervention staff via a self-administered cultural competence training manual • Engagement of clinic medical and nursing staff in decision making about individual clinic needs and preferences • Medical staff (e.g., primary care physicians, nursing staff, and diabetes nurses) received depression treatment training conducted by study psychiatrist and research staff • Communication methods with intervention staff determined by PCPs • Weekly clinical telephone conferences with study psychiatrist and DDCS • Standardized depression measures (e.g., PHQ-9) used to monitor and guide treatment decisions • Use of a clinical decision-making algorithm based on practice guidelines • Supplemental patient navigation intervention to address known barriers to both diabetes and depression treatments and to facilitate receipt of supportive services • Intense in person and/or telephone follow-up through remission and maintenance • Provision of culturally competent PST • Open-ended PST support group in English and Spanish during maintenance phase • Computerized encrypted patient tracking system available to DDCS, PN, and psychiatrist
Patient Level Adaptations	<ul style="list-style-type: none"> • Honored patients' treatment preference for first line depression treatment • Pre-therapy psycho-education sessions to dispel misconceptions about treatment, reduce stigma, and enhance therapeutic alliance • Inclusion of family members in treatment if preferred by patient • Health promotion messages linking depression to diabetes throughout treatments • Individualized relapse prevention plan • Linking PST problem-solving skills training to enhance diabetes and depression self-management and address socioeconomic stress • All PST homework and educational materials consistent with literacy and idiomatic patient need

Table 2Demographic Characteristics (*N* = 387)

	All <i>n</i> (%)
Gender	
Female	318 (82%)
Male	69 (18%)
Ethnicity	
Non-Hispanic	15 (4%)
Hispanic	372 (96%)
Age group	
<=54 yrs	184 (48%)
55 yrs+	203 (52%)
Birth place	
Foreign born	352 (91%)
U.S. born	35 (9%)
Years in U.S.	
<10 yrs	36 (9%)
10 yrs+	350 (91%)
Language use	
Not English	327 (85%)
English	60 (16%)
Education	
<High school	317 (82%)
High school+	70 (18%)
Employment status	
Unemployed	303 (78%)
Employed	84 (22%)
Marital status	
Unmarried	196 (51%)
Married	191 (49%)
Insurance coverage	
Medi-Cal/Medicare	70 (18%)
County care program	231 (60%)
Other	4 (1%)
None	82 (21%)

Table 3

Site Baseline Comparison Data

	ALL N = 387 n (%)	Roybal n = 219 n (%)	El Monte n = 168 n (%)	Bivariate analysis p	Multivariate analysis p
Clinical Characteristics					
Diabetes treatment					
Oral medication	268 (69.3)	146 (66.7)	122 (72.6)		
Insulin	54 (14.0)	22 (10.0)	32 (19.0)	0.01	0.01
Insulin plus oral medication	53 (13.7)	45 (20.5)	8 (4.8)	0.56	
Diet alone or none	12 (3.1)	6 (2.7)	6 (3.6)	0.76	
Diabetes complications					
0	65 (16.8)	24 (11.0)	41 (24.4)		
1	160 (41.3)	88 (40.2)	72 (42.9)	0.49	
2	106 (27.4)	72 (32.9)	34 (20.2)	0.33	
3	56 (14.5)	35 (16.0)	21 (12.5)	<0.01	
HbA1c 7%	310 (82.9)	168 (79.2)	142 (87.7)	0.03	
Moderate/severe depression (PHQ-9 15)	196 (50.6)	99 (45.2)	97 (57.7)	0.01	0.01
Taking psychotropic medication ^a	61 (15.8)	42 (19.2)	19 (11.3)	0.04	
Depression/anxiety counseling ^b	49 (12.7)	42 (19.2)	7 (4.2)	<0.0001	
Comorbid gastrointestinal disease	54 (14.0)	46 (21.0)	8 (4.8)	<0.0001	0.03
Comorbid eye disease	59 (15.2)	47 (21.5)	12 (7.1)	<0.001	
Comorbid arthritis	140 (36.2)	89 (40.6)	51 (30.4)	0.04	
Chronic pain	126 (32.6)	85 (38.8)	41 (24.4)	<0.01	
Taking pain medication	103 (26.6)	69 (31.5)	34 (20.2)	0.01	
Financial Stress					
No money left over at the end of month	302 (78.0)	202 (92.2)	100 (59.5)	<0.0001	<0.0001
Very worried about current financial situation	180 (46.5)	122 (55.7)	58 (34.5)	<0.0001	
Cost concerns—hospitalization	144 (37.2)	120 (54.8)	24 (14.3)	<0.0001	<0.0001
Financial situation is getting worse	142 (36.7)	98 (44.7)	44 (26.2)	<0.001	
Cost concerns—medication	95 (24.5)	66 (30.1)	29 (17.3)	<0.01	
Inability to get all prescribed medication	37 (9.6)	28 (12.8)	9 (5.4)	0.01	
Have problems getting to the clinic	83 (21.4)	58 (26.5)	25 (14.9)	0.01	

	ALL <i>N</i> = 387 <i>n</i> (%)	Roybal <i>n</i> = 219 <i>n</i> (%)	El Monte <i>n</i> = 168 <i>n</i> (%)	Bivariate analysis <i>p</i>	Multivariate analysis <i>p</i>
Social Stress Inventory					
Experiencing at least 1 or 12 stressors ^c	343 (88.6)	207 (94.5)	136 (81.0)	<0.0001	

^a55 patients taking SSRIs, 4 taking TCAs, 1 taking Benzodiazepine

^bReceiving from a doctor, social worker, or psychologist, some of whom were also among those taking psychotropic medication.

^cWork, unemployment, financial problems, marital/family conflicts, child/caregiving problems, cultural conflicts, legal or immigration problems, serious illness or death of family member, community violence or crime.

Table 4**Multiple Logistic Regression Models**

Risk factors for moderate/severe major depression (PHQ-9 score 15 or more)	OR	95% CI	p Value
Clinical Variables			
Diabetes symptoms (range 1–5)	2.48	(1.79–3.43)	<.0001
Diabetes complications			
1 vs. 0	1.78	(0.97–3.26)	0.06
2 vs. 0	1.67	(0.86–3.25)	0.13
3+ vs. 0	3.34	(1.51–7.42)	0.003
Linear Trend test	1.37	(1.08–1.74)	0.01
Diabetes Self-Care Activities (mean range 0–7)	0.97	(0.84–1.12)	0.67
Comorbid medical illness (yes vs. no) ^a	2.02	(1.04–3.96)	0.04
Depression symptoms (SCL-20, range 0–4)	3.70	(2.55–5.38)	<.0001
Dysthymia (yes vs. no)	1.72	(1.12–2.62)	0.01
Anxiety			
Anxiety score (BSI, range 0–24)	2.78	(0.95–8.08)	0.06
Severe anxiety (BSI ≥ 14)	1.13	(1.07–1.19)	<.0001
Chronic pain (yes vs. no)	2.16	1.35–3.46)	0.0013
Financial Stress			
Financial situation is getting worse	2.68	(1.68–4.26)	<.0001
Very worried about current financial situation	2.11	(1.36–3.27)	<.0001
No hope that financial situation will get better soon	1.86	(1.12–3.12)	0.02
Cost concerns—medication	1.96	(1.2–3.22)	<.01
Social Stress Inventory			
Experiencing at least 1 of 12 stressors ^b	3.12	(1.53–6.36)	<.01
Functional Status/Quality of Life			
SF-12 Summary Measures (general population mean = 50, higher = better)			
MCS (Mental component score)	0.94	(0.91–0.97)	<.0001
PCS (Physical component score)	0.93	(0.91–0.96)	<.0001
Sheehan Disability Scale (scale 0–10)	1.22	(1.12–1.32)	<.0001

Study site, birth place, years in the U.S. language use, age, and gender were controlled in the models.

^aHypertension, arthritis, eye disease, gastrointestinal disease, kidney disease, heart disease, cancer, urinary tract or prostate disease, chronic lung disease, or stroke.

^bWork, unemployment, financial problems, marital/family conflicts, child/care-giving problems, cultural conflicts, legal or immigration problems, serious illness or death of family member, community violence or crime.