The Association of Non–Insulin-Dependent Diabetes Mellitus With Perceived Quality of Life in a Biethnic Population: The San Luis Valley Diabetes Study

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ABSTRACT

Objectives. This study evaluated the association between quality of life and non–insulin-dependent diabetes mellitus (NIDDM) status, and whether this association differs between Hispanics and non-Hispanic Whites.

Methods. Between 1986 and 1989, cross-sectional data on perceived quality of life (PQOL) were collected from 223 persons with NIDDM and 753 nondiabetic subjects.

Results. After adjustment, persons with NIDDM rated their PQOL significantly lower than did control subjects. The relationship of diabetes and PQOL did not differ by ethnicity. The number of complications of diabetes was not associated with lower PQOL scores.

Conclusions. Control and treatment strategies should reflect an understanding of the impact that diabetes has on social functioning, leisure activities, and physical and mental health. (*Am J Public Health*. 1998;88:1225–1229)

Introduction

Much research has examined the association between quality of life and chronic illness, but some gaps in design and contrast remain. When quality of life has been investigated in people with assorted chronic conditions, rarely has a "normal," non-ill population group been used for comparison, although references may be made to general population norms.[1–6] Few studies have examined quality of life in Hispanic persons, and almost none have looked at quality of life in relation to acculturation in Hispanics. Some studies have explored how psychological distress, depression, or other indicators of mental health relate to acculturation in Hispanics; however, the results of these studies are inconsistent, with no clear indication of the direction of the association.[7–15]

The biethnic population studied in the San Luis Valley Diabetes Study provided a unique opportunity to examine the relationship between quality of life and non–insulin-dependent diabetes mellitus (NIDDM) in Hispanic and non-Hispanic White subgroups.

Methods

Study Design and Population

This study was a cross-sectional examination of self-rated quality of life among participants in the follow-up phase of the San Luis Valley Diabetes Study. The San Luis Valley Diabetes Study is a longitudinal study of NIDDM and its complications and risk factors; details on the design of the study are provided elsewhere.[16]

Of the original 1791 subjects who completed a baseline visit, 1340 (74.8%) completed a follow-up visit. Interviews, examinations, and laboratory assessments were done at both visits, including a 75-g oral glucose tolerance test that classified diabetes status according to the World Health Organization criteria.[17] Persons with diabetes were identified through medical record review in area practices. Nondiabetic control subjects were selected through a 2-stage household sampling process. For these analyses, the nondiabetic group included control subjects who tested as normal glucose tolerant or impaired glucose tolerant at both their baseline and follow-up visits; diabetic subjects had diagnoses confirmed by the oral glucose tolerance test.

Of those completing a follow-up visit, 976 subjects (223 with NIDDM and 753 without) met the above inclusion criteria and had all the data required for these analyses. Comparisons made between follow-up respondents and baseline subjects revealed that persons completing follow-up were more likely to be non-Hispanic White and that they had, on average, completed more years of education. Among respondents with complete data on perceived quality of life (PQOL) and diabetes status, some were missing other selected data items. Further analyses examined differences between those with complete versus missing data. Those who were missing data were more likely to be older, of lower socioeconomic status, and of poorer health. However, when the relationship between diabetes and PQOL, the main result of interest, was examined by missing-data status, the associations were not different in the 2 groups. Controlling for the possible confounding of the adjustment variables was deemed preferable to the loss of precision resulting from excluding those with missing data.

Measures

Perceived quality of life. The outcome variable was the sum of responses to the items constituting the Perceived Quality of Life Scale developed by Patrick et al.[18] On a scale of 1 to 100, subjects rated their satisfaction with each of 10 areas of their life having to do with physical, mental, and social functioning. (The complete scale is available from Donald Patrick,

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Health-related variables. The conditions included in the variable number of chronic conditions were angina, hypertension, stroke, heart condition, pulmonary conditions, kidney disease, arthritis, liver disease, ulcer, gout, shortness of breath, claudication, urine burning, cancer, and poor visual acuity. From the inventory of medications taken by subjects, 2 medication variables were formed: number of psychiatric medications, included because such medications have a known mood-altering effect, and number of other medications, the number of other prescription medications taken. Phvsical activity level was classified as sedentary, moderate, or vigorous. Self-rated health was assessed by asking subjects to rate their health relative to that of other persons their age.

Diabetes-related variables. Current therapy was categorized as insulin, oral hypoglycemics, or none/diet only (if the subject was controlling the disease with diet alone or reported receiving no treatment for diabetes). Severity of diabetes was assessed by number of diabetes-related complications, including retinopathy,[19] neuropathy,[20] and nephropathy.[21] Heart disease was considered under other chronic conditions as part of a comorbidity measure, since both diabetic and nondiabetic subjects may have heart disease. Duration of diabetes was years since diagnosis.

Other sociodemographic variables. Ethnicity was self-reported, in answer to the 1980 census question "Are you of Hispanic or Spanish origin or descent?" Acculturation, defined as the degree to which a person is oriented toward mainstream Anglo-American culture vs Hispanic culture, was assessed by an acculturation scale originally developed by Hazuda et al. for use in the San Antonio Heart Study,[22] modified for use in the San Luis Valley. Size of social network (the number of social contacts) was formed by adding the reported numbers of close friends and close relatives. The socioeconomic index was a Duncan-style prestige score assigned to subjects' occupational titles, based on the 1980 census codes.[23,24] Educational attainment was measured as years of school completed at time of follow-up. Income was reported in categories for the prior year's total family income from all sources.

TABLE 1—Characteristics of Study Participants: San Luis Valley Diabetes Study, 1988–1992

	Distribution, %			Mean PQOL Scores (with 95% Confidence Intervals), All Subjects
	All Subjects (n = 976)	Non-Hispanic Whites (n = 560)	Hispanics (n = 416)	
Diabetes status				
Nondiabetic	77.2	85.5	65.9[a]	821 (812, 831)[b]
NIDDM	22.8	14.5	34.1	770 (752, 787)
Ethnicity				
Non-Hispanic White	57.4	...	...	806 (795, 818)
Hispanic	42.6	...	...	814 (801, 827)
Sex				
Male	50.3	50.9	49.5	812 (800, 824)
Female	49.7	49.1	50.5	807 (795, 819)
Age, y				
25–44	15.8	13.8	18.5	779 (758, 800)[b]
45–54	23.0	22.3	23.8	782 (765, 800)
55–64	31.9	32.0	31.7	824 (809, 838)
65–74	24.8	27.7	20.9	829 (812, 846)
75+	4.6	4.3	5.0	848 (809, 888)
Education, y				
0–11	26.3	13.9	43.0[a]	816 (799, 833)
12	34.6	36.6	32.0	808 (793, 822)
>12	39.0	49.5	25.0	807 (793, 820)
Income, $				
<10 000	20.4	12.3	31.3[a]	781 (762, 800)[b]
10 000–24 999	40.2	38.9	41.8	813 (800, 826)
25 000–49 999	28.6	35.2	19.7	815 (799, 831)
50 000+	10.9	13.6	7.2	836 (810, 862)
Marital status				
Not married	22.3	19.5	26.2[a]	791 (773, 809)
Married	77.7	80.5	73.8	815 (805, 825)
No. of chronic conditions				
0	28.9	30.0	27.4	830 (814, 846)[b]
1+	71.1	70.0	72.6	801 (791, 811)
Self-rated health status				
Excellent	31.5	35.9	25.5[a]	859 (845, 873)[b]
Good	45.5	50.4	38.9	817 (805, 828)
Fair	17.6	10.5	27.2	755 (737, 774)
Poor	5.4	3.2	8.4	637 (603, 671)
Current therapy[c]				
None/diet only	16.6	25.9	11.3[a]	780 (725, 835)
Oral hypoglycemics	32.3	27.2	35.2	789 (757, 821)
Insulin	51.1	46.9	53.5	754 (723, 785)
Duration of diabetes, y[c]				
0–2	26.0	30.9	23.2	807 (769, 845)
3–5	20.6	27.2	16.9	765 (718, 812)
6–10	17.0	16.0	17.6	762 (715, 809)
11–20	26.9	19.8	31.0	769 (732, 806)
21+	9.4	6.2	11.3	692 (595, 789)
No. of diabetes-related complications[c]				
0	65.0	61.7	66.9	792 (766, 818)[b]
1+	35.0	38.3	33.1	728 (693, 763)

Note. PQOL = perceived quality of life, rated on a 1000-point scale. NIDDM = non–insulin-dependent diabetes mellitus.
[a]Hispanic frequency distribution different from non-Hispanic White distribution, differences tested with χ^2 test of proportions: $P < .05$.
[b]Differences in mean PQOL scores by subgroup tested with analysis of variance; $P < .05$.
[c]Subjects with NIDDM only.

Statistical Analysis

Analyses were performed with the statistical package SAS.[25] Chi-square tests were used to test for differences in proportions. Regression modeling was used to explore associations between diabetes and PQOL. Backward stepwise procedures were used to arrive at reduced models. The LSMEANS option in SAS was used to compute adjusted means with standard errors of PQOL.

Results

Subjects tended to rate their quality of life fairly high. On a 1000-point scale, the mean

TABLE 2—Multiple Regression Associations of Perceived Quality of Life (PQOL) Scores with Diabetes Status, Demographic Characteristics, and Health-Related Variables in Total Study Population (n = 976): San Luis Valley Diabetes Study, 1988–1992

	Full Model (Adjusted R^2 = 0.247)		Reduced Model (Adjusted R^2 = 0.244)	
	β[a]	95% CI	β[a]	95% CI
Diabetes status (0 = nondiabetic, 1 = NIDDM)	–30.73**	–51.27, –10.19	–26.75**	–46.08, –7.41
Ethnicity (0 = non-Hispanic White, 1 = Hispanic)	44.47***	27.57, 61.38	46.98***	31.02, 62.94
Sex (0 = Male, 1 = Female)	12.13	–3.99, 28.25	. . .	. . .
Age (years)	2.94***	2.16, 3.72	3.05***	2.32, 3.79
Education (years)	–4.18*	–7.47, –0.90	. . .	. . .
Income ($1000s)	0.33	–0.12, 0.79	. . .	. . .
SEI (1980 Duncan-style occupational score)	0.31	–0.19, 0.81	. . .	. . .
Marital status (0 = not married, 1 = married)	26.86**	7.90, 45.82	27.42**	9.30, 45.53
Size of social network (no. of friends and family)	6.44***	3.64, 9.24	6.14***	3.38, 8.91
No. of chronic conditions	–14.08***	–20.59, –7.56	–14.12***	–19.87, –8.37
No. of psychiatric medications	–21.78	–44.61, 1.04	. . .	. . .
No. of other medications	3.18	–2.99, 9.36	. . .	. . .
Physical activity level (1 = sedentary, 2 = moderate, 3 = vigorous)	5.26	–4.23, 14.74	. . .	. . .
Self-rated health (1 = excellent, 4 = poor)	–50.05***	–60.95, –39.16	–50.82***	–61.24, –40.40

Note. CI = confidence interval; NIDDM = non-insulin-dependent diabetes mellitus; SEI = socioeconomic index.
[a]Parameter estimate for difference in PQOL scores from linear regression model with all variables listed for each model.
*$P < .05$; ** $P < .01$;*** $P < .001$.

PQOL score was 809, with a standard deviation of 136 and a median of 835. Characteristics of the study population at follow-up are presented in Table 1, along with unadjusted mean PQOL by characteristic. Univariately, subjects with NIDDM rated their PQOL significantly lower (mean score = 770; 95% confidence interval [CI] = 752, 787) than did nondiabetic subjects (821; 95% CI = 812, 831). Non-Hispanic White persons (806; 95% CI = 795, 818) and people of Hispanic origin (814; 95% CI = 801, 827) had similar PQOL scores. Among subjects with diabetes, without adjustment for other factors, those with no diabetic complications rated their quality of life higher (792; 95% CI = 766, 818) than did those with 1 or more complications (728; 95% CI = 693, 763).

A model was formed on the basis of the entire population to determine whether the relationship between diabetes status and PQOL existed after adjustment for all important demographic and health-related covariates. As shown in Table 2, after adjustment for listed factors, the relationship between diabetes and PQOL remained significant, with diabetic subjects rating their PQOL 30.73 points (95% CI = –51.27, –10.19) lower than those without NIDDM. The association between diabetes status and PQOL was similar in a reduced model, also shown in Table 2. In addition, increasing age, being married, having a larger social network, having fewer chronic conditions, and having higher self-rated health were associated with higher PQOL.

After adjustment, Hispanics rated their PQOL 44.47 points higher (95% CI = 27.57, 61.38) than did non-Hispanic whites. An interaction term between diabetic status and ethnicity was not significant when entered into the model ($P = .3779$), demonstrating that the impact of diabetes was the same in both ethnic groups. Among Hispanics only, the association between acculturation and PQOL was examined. Univariately there was no correlation. Adjustment for acculturation among Hispanics did not affect results related to ethnicity or diabetes status and PQOL (data not shown).

The association of diabetes-related variables with PQOL scores was tested among subjects with diabetes. As shown in Table 1, without adjustment for other factors, diabetic persons with 1 or more complications had lower PQOL ratings than those without complications. Duration of diabetes and type of treatment were not univariately associated with PQOL ratings. As seen in Table 3, none of these diabetes-related variables were significantly related to PQOL ratings in either the full or the reduced model. To test whether inclusion of self-rated health resulted in overadjustment for health status, thereby masking the effects of these diabetes-related variables, models were analyzed without this variable. Even with the removal of self-rated health from the analysis, these indicators of severity of diabetes continued to be unassociated with PQOL. However, an increasing number of chronic conditions, which could include heart disease, remained significantly associated with lower PQOL.

Conclusion

These results show that persons with NIDDM rate their quality of life lower than do those without NIDDM. In previous studies, depression, which is at least theoretically related to quality of life, or depressive symptoms were found to be more prevalent among subjects with diabetes.[26–28] One of these studies concluded that depressive symptoms in persons with NIDDM appeared to be the result of psychosocial stress associated with increasing age, poor physical health, and the disease label.[26] Studies that have examined quality of life only among diabetic persons have found that most subjects felt that diabetes affected their lives in negative ways,[29–33] although some found positive impacts as well, such as improved relationships or being forced to eat more nutritiously or live a more healthy lifestyle.[32]

In contrast to most of the other quality-of-life studies, this analysis allowed a comparison of quality of life between 2 ethnic groups. While limited in number, previous studies among the general population suggest that Hispanics rate their quality of life lower than non-Hispanic Whites.[13–14] In this population, after adjustment, Hispanics' PQOL scores were higher than those of non-Hispanic Whites, although the association of diabetes and PQOL was similar in the 2 ethnic groups. On the other hand, consistent with the literature about Hispanics and self-rated health,[34] and with more detailed analyses from this population,[35] Hispanics rated their own health lower than did non-Hispanic Whites. While in both ethnic groups lower self-rated health was associated with lower PQOL ratings, the overall contrast of lower self-rated health but higher quality-of-life ratings among Hispanics was surprising.

This study also examined whether other diabetes-related factors were associated with

TABLE 3— Multiple Regression Associations of Perceived Quality of Life (PQOL) Scores With Diabetes-Related Characteristics, Demographic Characteristics, and Health-Related Variables Among Subjects With Non–Insulin-Dependent Diabetes Mellitus (n = 223): San Luis Valley Diabetes Study, 1988–1992

	Full Model (Adjusted $R^2 = 0.281$)		Reduced Model (Adjusted $R^2 = 0.269$)	
	β[a]	95% CI	β[a]	95% CI
Current therapy				
Oral hypoglycemics vs insulin	−15.41	−57.76, 26.94	−6.14	−48.02, 35.74
None or diet only vs insulin	−26.16	−81.53, 28.25	−14.00	−68.36, 40.37
Duration of diabetes (years)	−1.56	−4.32, 1.20	−2.18	−4.90, 0.53
No. of diabetes-related complications	−1.63	−32.41, 29.16	4.21	−25.76, 34.18
Ethnicity (0 = NHW, 1 = Hispanic)	69.50**	25.09, 113.92	65.76**	24.64, 105.87
Sex (0 = male, 1 = female)	39.93*	0.18, 79.67	. . .	. . .
Age (years)	4.03***	1.93, 6.12	4.58***	2.64, 6.51
Education (years)	−4.67	−11.75, 2.40	. . .	. . .
Income ($1000s)	0.57	−0.64, 1.78	. . .	. . .
SEI (1980 Duncan-style occupational score)	0.91	−0.38, 2.21	. . .	. . .
Marital status (0 = not married, 1 = married)	52.05*	7.61, 95.50	46.67*	3.49, 89.86
Size of social network (no. of friends and family)	4.67	−1.32 10.66	. . .	. . .
No. of chronic conditions	−18.69**	−32.58, −4.79	−19.59**	−32.00, −7.18
No. of psychiatric medications	−58.15*	−107.81, −8.49	. . .	. . .
No. of other medications	5.95	−5.57, 17.46	. . .	. . .
Physical activity level (0 = sedentary, 1 = moderate, 2 = vigorous)	−12.80	−36.93, 11.33	. . .	. . .
Self-rated health (1 = excellent, 4 = poor)	−6l.48***	−86.29, −36.67	57.35***	−81.10, −33.60

Note. CI = confidence interval; NHW = non-Hispanic White; SEI = socioeconomic index.
[a]Parameter estimate for difference in PQOL scores from linear regression model with all variables listed for each model.
*$P < .05$; **$P < .01$; ***$P < .001$.

quality of life. The factors examined—duration of diabetes, presence of complications, and type of therapeutic regimen—were found to be unrelated to PQOL after adjustment for other variables. In contrast, some earlier studies found that the number or severity of diabetic complications did affect quality of life among those with diabetes.[30,36] Among studies examining depression and diabetes, some found associations of greater severity with increased depression,[37,38] but one did not.[39] That this study did not find an association between diabetic complications and PQOL may indicate that when a subjective, global measure of quality of life is used, the impact of diabetic complications is negligible compared with their impact on a quality-of-life measure that focuses on health status or patient functioning.

In 2 studies, duration of diabetes and quality of life were not associated.[30,33] However, another study found that among subjects with 6 different chronic conditions, including diabetes, those whose diagnosis had occurred less than 3 months earlier displayed more anxiety, depression, and loss of control than those whose diagnosis had occurred longer ago.[6] In light of this finding, given that almost all of the diabetic subjects in our study had been diagnosed more than 3 months before their clinic visit, perhaps it is not surprising that duration was not associated with quality of life. However, the chronic disease variable was significantly associated with PQOL among all subjects, and this may be a marker of the importance of heart disease, a major diabetic complication, in both diabetic and nondiabetic populations.

In conclusion, living with diabetes can have negative impacts on a person's quality of life. Even in the absence of complications, persons with diabetes in both ethnic groups in this study rated their quality of life lower than did those without diabetes. These results suggest that clinicians might investigate with their diabetic patients a wider variety of areas (i.e., social functioning, leisure activities, and physical and mental health) in which diabetes might have an impact, so that control and treatment strategies reflect this understanding. □

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References

1. Mason JH, Weener JL, Gertman PM, Meenan RF. Health status in chronic disease: a comparative study of rheumatoid arthritis. *J Rheumatol.* 1983;10:763–768.
2. Burckhardt CS, Clark SR, Bennett RM. Fibromyalgia and quality of life: a comparative analysis. *J Rheumatol.* 1993;20:475–479.
3. Stewart A, Greenfield S, Hays RD, et al. The functioning and well-being of patients with chronic conditions: results from the Medical Outcomes Study. *JAMA.* 1989;262:907–913.
4. Pearlman RA, Uhlmann RF. Quality of life in chronic diseases: perceptions of elderly patients. *J Gerontol.* 1988;43(2):M25–M30.
5. Pearlman RA, Uhlmann RF. Quality of life in elderly, chronically ill outpatients. *J Gerontol.* 1991;46(2):M31–M38.
6. Cassileth BR, Lusk EF, Strouse TB, et al. Psychosocial status in chronic illness. A comparative analysis of six diagnostic groups. *N Engl J Med.* 1984;311:506–511.
7. Burnam MA, Hough RL, Karno M, Escobar JI, Telles CA. Acculturation and lifetime prevalence of psychiatric disorders among Mexican Americans in Los Angeles. *J Health Soc Behav.* 1987; 28:89–102.
8. Krause N, Bennett J, Van Tran T: Age differences in the acculturation process. *Psychol Aging.* 1989;4:321–332.
9. Krause N, Goldenhar LM. Acculturation and psychological distress in three groups of elderly Hispanics. *J Gerontol.* 1992;47(6):S279–S288.
10. Griffith J. Relationship between acculturation and psychological impairment in adult Mexican Americans. *Hispanic J Behav Sci.* 1983;5: 431–459.
11. Griffith J, Villavicencio S. Relationships among acculturation, sociodemographic characteristics and social supports in Mexican American adults. *Hispanic J Behav Sci.* 1985;7:75–92
12. Kaplan MS, Marks G. Adverse effects of acculturation: psychological distress among Mexican American young adults. *Soc Sci Med.* 1990; 31:1313–1319.

13. Vega W, Warheit G, Buhl-Auth J, Meinhardt K. The prevalence of depressive symptoms among Mexican Americans and Anglos. *Am J Epidemiol.* 1984;120:592–607.
14. Lang JG, Muñoz RF, Bernal G, Sorensen JL. Quality of life and psychological well-being in a bicultural Latino community. *Hispanic J Behav Sci.* 1982;4:433–450.
15. Rogler LH, Cortes DE, Malgady RG. Acculturation and mental health status among Hispanics: convergence and new directions for research. *Am Psychol.* 1991;46:585–597.
16. Hamman RF, Marshall JA, Baxter J, et al. Methods and prevalence of non-insulin-dependent diabetes mellitus in a biethnic Colorado population: the San Luis Valley Diabetes Study. *Am J Epidemiol.* 1989;129:295–311.
17. *Diabetes Mellitus: Report of a WHO Study Group.* Geneva, Switzerland: World Health Organization; 1985. Technical Report Series, No. 727.
18. Patrick DL, Danis M, Southerland LI, Hong G. Quality of life following intensive care. *J Gen Intern Med.* 1988;3:218–223.
19. Hamman RF, Mayer EJ, Moo-Young GA, Hildebrandt W, Marshall JA, Baxter J. Prevalence and risk factors of diabetic retinopathy in non-Hispanic whites and Hispanics with NIDDM: San Luis Valley Diabetes Study. *Diabetes.* 1989;30: 1231–1237.
20. Franklin GM, Kahn LB, Baxter J, Marshall JA, Hamman RF. Sensory neuropathy in non-insulin-dependent diabetes mellitus. The San Luis Valley Diabetes Study. *Am J Epidemiol.* 1990;131: 633–643.
21. Hamman RF, Franklin GA, Mayer EJ, et al. Microvascular complications of NIDDM in Hispanics and non-Hispanic whites. San Luis Valley Diabetes Study. *Diabetes Care.* 1991; 14(suppl 3):655–664.
22. Hazuda HP, Stern MP, Haffner SM. Acculturation and assimilation among Mexican Americans: scales and population-based data. *Soc Sci Q.* 1988;69:687–706.
23. Duncan OD. A socioeconomic index for all occupations. In: Feiss AJ Jr, ed. *Occupations and Social Status.* New York, NY: Free Press; 1961.
24. Stevens G, Cho JH. Socioeconomic indexes and the new 1980 census occupational classification scheme. *Soc Sci Res.* 1985;14:142–168.
25. *SAS User's Guide: Statistics, Version 6.* Cary, NC: SAS Institute Inc; 1987.
26. Palinkas LA, Barrett-Conner E, Wingard DL. Type 2 diabetes and depressive symptoms in older adults: a population-based study. *Diabet Med.* 1991;8:532–539.
27. Friis R, Nanjundappa G. Diabetes, depression and employment status. *Soc Sci Med.* 1986;23: 471–475.
28. Wing RR, Marcus MD, Blair EH, Epstein LH, Burton LR. Depressive symptomatology in obese adults with type II diabetes. *Diabetes Care.* 1990;13:170–172.
29. Mayou R, Bryant B, Turner F. Quality of life in non-insulin dependent diabetes and a comparison with insulin-dependent diabetes. *J Psychosom Res.* 1990;34:1–11.
30. Jacobsen AM, de Groot M, Samson JA. The evaluation of two measures of quality of life in patients with type I and type II diabetes. *Diabetes Care.* 1994;17:267–274.
31. Lundman B, Asplund K, Norberg A. Living with diabetes: perceptions of well-being. *Res Nurs Health.* 1990;13:225–262.
32. Gåfvels C, Lithner F, Börjeson B. Living with diabetes: relationship to gender, duration and complications. A survey in northern Sweden. *Diabet Med.* 1993;10:768–773.
33. Hanestad BR. Self-reported quality of life and the effect of different clinical and demographic characteristics in people with type I diabetes. *Diabetes Res Clin Pract.* 1993;19:139–149.
34. Becerra RM, Shaw D: *The Hispanic Elderly. A Research Reference Guide.* New York, NY: University Press of America; 1984:27–28.
35. Shetterly SM, Baxter J, Mason LD, Hamman RF. Self-rated health among Hispanic and non-Hispanic White adults: the San Luis Valley Health and Aging Study. *Am J Public Health.* 1996;86:1798–1801.
36. Rodin G. Quality of life in adults with insulin-dependent diabetes mellitus. *Psychother Psychosom.* 1990;54(2–3):132–139.
37. Lloyd CE, Matthews KA, Wing RR, Orchard TJ. Psychosocial factors and complications of IDDM: the Pittsburgh Epidemiology of Diabetes Complications Study VIII. *Diabetes Care.* 1992;15:166–172.
38. Robinson N, Fuller JH, Edmeades SP. Depression and diabetes. *Diabet Med.* 1988;5:268–274.
39. Lustman PJ, Griffith LS, Clouse RE. Depression in adults with diabetes: results of 5-year follow-up study. *Diabetes Care.* 1988;11:605–612.