

A Prospective Analysis of Marital Relationship Factors and Quality of Life in Diabetes

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OBJECTIVE — To prospectively assess the relation between marital relationship domains (i.e., intimacy and adjustment) and health-related quality of life (HRQoL) and glycemic control of individuals with diabetes.

RESEARCH DESIGN AND METHODS — A previous cross-sectional study assessed the relationship between marital quality and adaptation to diabetes for 78 insulin-treated adults. Each participant completed two marital quality measures (Spanier Dyadic Adjustment Scale and Personal Assessment of Intimacy in Relationships Scale) at time 1 (T1). A total of 61 subjects were contacted two years later (time 2 [T2]) and re-administered four HRQoL measures (Diabetes Quality of Life Scale, Medical Outcomes Study Health Survey-SF36, Problem Areas in Diabetes Scale, and Positive and Negative Affect Schedule). Glycemic control was assessed by HbA_{1c}. Demographic data (age, sex, type and duration of diabetes, years married, other medical problems, family history, and years of education) were gathered from charts and questionnaires. Linear regression analyses were used to assess the ability of the two marital measures at T1 to predict HRQoL at T2, controlling for confounding HRQoL and baseline subject variables.

RESULTS — Both of the marital quality measures at T1 were prospective predictors of aspects of HRQoL at T2. Less diabetes-related distress at T2 was predicted by better marital adjustment at T1. Greater satisfaction with aspects of the diabetes care regimen at T2 was predicted by better marital adjustment and greater perceived marital intimacy at T1. Neither marital measure predicted general HRQoL or glycemic control.

CONCLUSIONS — For insulin-treated adults with diabetes, quality of marriage prospectively predicts diabetes-related quality of life. This study highlights the sensitivity of diabetes-specific measures. Future work should explore the value of interventions that target the spouse and/or couple.

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Medical researchers have increasingly focused on assessing outcomes of interventions from the perspective of the patient, rather than merely the absence or presence of symptoms of disease. This area of assessment seeks to evaluate the individual's health-related quality of life (HRQoL), i.e., the impact of an individual's health status on

his ability to function in the important domains of his life (1). HRQoL has been defined as a multidimensional construct (2,3). Overall, HRQoL includes the patient's sense of his well-being within the multiple domains of psychological, social, and physical functioning, as well as the disease-specific domain, which reflects one's sense of how a specific disease

is uniquely impacting function in those three domains. For individuals with diabetes, Polonsky (3) eloquently describes HRQoL as “a formalized way of talking about the personal side of diabetes, the felt burden of living with the illness, how diabetes can get in the way of living a rich, full life.” Studies have demonstrated that diabetes can negatively affect HRQoL (4). Diabetes can compromise physical function [e.g., development of complications (5)], psychological status [e.g., depression (6)], and social relationships [(e.g., interpersonal conflict (7))].

There is a growing recognition that improvements in HRQoL should be considered primary end points in medical intervention and outcome studies (8,9). Therefore, it is important to identify the factors impacting HRQoL that might be targeted by interventions aimed at helping patients adapt.

Fisher et al. (10) have convincingly argued for the adoption of a social systems perspective of diabetes self-management. There are many studies in which better illness adaptation and HRQoL have been related to greater family support and/or less family conflict (11–15). The influence of marital support has been shown to be significant for couples coping with other illnesses (16,17) and similarly may be particularly significant for couples in which one partner has diabetes, as the diabetes care regimen (e.g., food purchase and preparation, medication administration, and exercise involvement) often involves the spouse (16). For example, a supportive spouse may share in a patient's diet plan, whereas a nonsupportive spouse may insist on eating high carbohydrate foods. Initial work examining this relationship has shown that spouse involvement in diabetes education programs improves outcomes (18,19), whereas spouse criticality relates to poorer blood glucose control (20).

To examine whether marital quality does relate to the HRQoL of diabetes patients, we performed a cross-sectional study (21) of 78 insulin-treated adults in which we administered measures of mar-

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Abbreviations: DAS, Spanier Dyadic Adjustment Scale; DQOL, Diabetes Quality of Life Scale; HRQoL, health-related quality of life; PAID, Problem Areas in Diabetes Scale; PAIR, Personal Assessment of Intimacy in Relationships Scale; PANAS, Positive and Negative Affect Schedule.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

ital quality (marital adjustment and intimacy) and diabetes-specific and overall HRQoL. Better marital adjustment was related to higher levels of diabetes-related satisfaction and less impact, better general HRQoL, and less diabetes-related distress. Similarly, greater marital intimacy was related to better diabetes-related and overall HRQoL. Also, there was a nonsignificant trend for marital adjustment scores to relate to glycemic control ($P = 0.0568$).

Because this was a correlational study, the observed relationships are interesting, but merely suggestive of a link between marital quality and HRQoL. The data cannot distinguish between the interpretation that poor marital relationships lead to poor illness adaptation and the hypothesis that poor adaptation leads to a more problematic marital relationship. In the current study, we returned to these 78 individuals 2 years after the first examination for a follow-up assessment. Our goal was to provide stronger evidence that marital quality independently predicts aspects of HRQoL. Because partners are frequently involved in diabetes self-management, we hypothesized that better marital quality would predict better diabetes-specific quality of life. Based on our cross-sectional data, we hypothesized that this effect would be most likely to occur in the social and emotional realms.

RESEARCH DESIGN AND METHODS

A total of 78 subjects had been recruited at the Joslin Diabetes Center at SUNY Upstate Medical University in Syracuse, New York, in 1999 for the cross-sectional study described above. Potential participants were identified from chart review to determine whether they met the following inclusion criteria: 18–55 years of age; diagnosed with diabetes for at least 1 year; using insulin daily (to minimize the potential effect of type of treatment); married for at least 1 year; and able to provide written informed consent, which included consent to follow-up re-assessment. Patients were approached by a research assistant at their scheduled healthcare visit and, if enrolled, completed questionnaires and returned them by mail. Demographic and medical data were gathered from the chart. This study was approved by the Institutional Review Board of the SUNY Upstate Medical University. At that time (time 1 [T1]), partic-

ipants completed measures of marital quality and overall and diabetes-specific HRQoL. Approximately 2 years later (time 2 [T2]), these individuals were contacted again by a research assistant, who re-administered the HRQoL questionnaires by telephone and gathered demographic and medical data from the chart. This assistant was blind to the previous test results and research data. A total of 61 individuals were able to be re-contacted and were willing to complete the second assessment.

Marital quality measures

Spanier Dyadic Adjustment Scale. The Spanier Dyadic Adjustment Scale (DAS) (22) is a widely used 32-item self-report measure of marital adjustment. A higher score indicates better reported marital quality. The DAS has shown good reliability (Cronbach $\alpha = 0.96$) and construct validity with high correlation with the widely used Locke-Wallace Marital Adjustment Test (23). The DAS was administered at T1.

Personal Assessment of Intimacy in Relationships Scale. The Personal Assessment of Intimacy in Relationships Scale (PAIR) (24), a 36-item self-report measure of perceived marital intimacy, includes emotional, sexual, social, recreational, and intellectual aspects of intimacy. The Cronbach α values of all the scales are >0.70 , and validity is supported with significant correlation with other marital satisfaction scales (22). As in previous research (25,21), an overall measure of marital intimacy was created by summing scale scores. Direction of scoring was transformed so that a higher overall score reflected higher levels of intimacy. The PAIR was administered at T1.

HRQoL measures

These measures were chosen because, as recommended (26), they complemented one another by assessing both diabetes-specific and overall physical and emotional domains.

Problem Areas in Diabetes Scale. The Problem Areas in Diabetes Scale (PAID) (27) is a 20-item measure of current diabetes-related emotional distress used to assess the subjective experience of the impact of diabetes on emotional status. Subjects rate (on a six-point scale) the degree to which a situation that is considered a common problem for individuals with diabetes is currently a problem for them.

High internal reliability (Cronbach $\alpha = 0.95$), association with HbA_{1c}, adherence and distress (28), and responsiveness to intervention (29) have been demonstrated. The PAID was administered at T1 and T2.

Diabetes Quality of Life Scale. The Satisfaction and Impact subscales of the Diabetes Quality of Life Scale (DQOL) (30) were used to assess (on a five-point scale) how currently satisfied subjects are with the aspects of their life that relate to diabetes and how much of an impact diabetes has on their lives. It provides a measure of disease/treatment-specific adaptation, as questions include perceived effect of diabetes on physical, social, and emotional function. The Cronbach α (range 0.67–0.92) establishes its reliability, and significant correlation with other quality of life measures establishes its validity (26). The DQOL was administered at T1 and T2.

Positive and Negative Affect Schedule. The Positive and Negative Affect Schedule (PANAS) (31) is a measure of general emotional status over the previous 4 weeks. It includes two 10-item scales. One measures positive affect, i.e., extent to which the individual feels alert, active, and enthusiastic. The other measures negative affect, i.e., extent to which the individual feels contempt, anger, fear, guilt, disgust, and anxiety. Subjects rate (on a five-point scale) the extent to which they had experienced these feelings during the previous 4 weeks. The Cronbach $\alpha = 0.84–0.90$, and excellent convergent (correlations with relevant scales range from 0.89 to 0.95) and discriminant (correlations with relevant scales range from 0.02 to 0.18) validity have been demonstrated. The PANAS was administered at T1 and T2.

Medical Outcomes Study Health Survey (SF-36). This 36-item measure (32) assesses perceived status during the previous 4 weeks on eight domains of function and is widely used to assess overall HRQoL. As described elsewhere (33), physical composite scores, assessing the impact of health on physical function, and mental composite scores, assessing impact of health on social/emotional function, were calculated. Internal consistency reliabilities range from 0.81 to 0.88, and good correlations with other general quality of life measures support its validity (34). The SF-36 was administered at T1 and T2.

Table 1—Demographic characteristics of subjects

Age (years)	47.1 ± 11.6
Male	23 (38)
Education (years)	14.0 ± 2.8
Years married	20.8 ± 13.3
Type 1 diabetes	31 (56)
Duration of diabetes (years)	17.0 ± 11.2
Family history of diabetes	28 (47)
Number of health conditions	1.7 ± 1.6
Number of complications	1.2 ± 1.1
HbA _{1c}	7.7 ± 1.1

Data are means ± SD or n (%).

Metabolic control. HbA_{1c} (values reflect the average blood glucose reading over the previous 3 months, reference range 4.4–6.4%), widely accepted as a reliable and valid index of metabolic control, was determined using the DCA 2000+ Analyzer (Bayer, Elkhart, IN). At T2, HbA_{1c}, routinely measured at scheduled 3-month clinic visits, was recorded from the medical chart if it had been assessed within 2 months of the time of questionnaire administration.

Statistical analysis

We first performed a series of univariate linear regressions between PAIR and DAS at T1 and the seven HRQoL measures at T2. We then tested the baseline subject variables (e.g., age, sex, and diabetes type; see Table 1) against our predictors (i.e., PAIR and DAS) to assess whether subject characteristics were confounding our ability to predict HRQoL at T2. Pearson’s correlation coefficient was calculated for continuous baseline measures, whereas ANOVA was used to compare the means

of PAIR and DAS between subgroupings of categorical variables.

We performed two forward stepwise multiple linear regression analyses of each T2 outcome variable, regressing it on its T1 value and one of the two marital quality measures. We included potential confounders for each analysis. To identify confounders, we selected those baseline subject characteristics that were associated ($P \leq 0.20$) with the T1 value of the marital quality variable for that model. These variables were allowed to enter the regression model if they met a liberal criterion for entry (P to enter ≤ 0.15). This procedure for reducing confounding was chosen because the limited number of cases precludes entering a large number of control variables. We abstracted the adjusted β -estimate (i.e., slope) with the 95% CI and the partial R^2 from each of the regression models. The partial R^2 is the amount contributed by the marital variable to predict HRQoL at T2 while controlling for HRQoL at T1. For example, every 1-unit increase in PAIR corresponds to a 3.6-point decrease in PAID. All tests of significance were two-tailed, and analyses were performed using the SAS software.

RESULTS— The demographic characteristics of the subject sample are presented in Table 1. The mean age of the group was 47.1 years, 38% of the sample were male, the average level of education was 14 years, and the mean length of the marriage was 21 years. More than half (56%) had type 1 diabetes, with an average time since diagnosis of 17 years and a mean of 1.2 complications and of 1.7 other medical problems.

The 61 subjects who were assessed at T2 were compared with the 17 subjects of the initial study whom we were not able to contact on all demographic, medical, and psychosocial variables. On the demographic variables, the only significant differences found were that the T2 subjects had been married longer (20.8 vs. 13.6 years, $P = 0.041$) and were somewhat older (47.1 vs. 41.1 years, $P = 0.055$). There was no significant difference in terms of mean metabolic control. Scores on the HRQoL measures (PANAS, DQOL, PAID, and SF-36) did not differ, nor did the scores on the measures of marital quality (PAIR and DAS).

Table 2 summarizes the results of the stepwise multiple regression analyses examining the effect of marital quality on HRQoL. Each HRQoL variable at T2 was adjusted with the appropriate HRQoL score at T1 and the baseline subject variables that entered the equations.

Diabetes-related distress (PAID) and satisfaction with aspects of life associated with diabetes (DQOL satisfaction subscale) were both predicted by the marital quality measures. After adjusting for baseline education and DQOL satisfaction, scores on the PAIR scale significantly predicted scores on the satisfaction subscale of the DQOL ($\beta = 5.3, P \leq 0.05$), with greater intimacy at T1 predicting greater satisfaction with the diabetes regimen at T2. Scores on the DAS also significantly predicted scores on the satisfaction subscale of the DQOL ($\beta = 0.3, P \leq 0.05$), with better marital adjustment at T1 predicting greater satisfaction with the diabetes regimen at T2, after adjusting for family history of diabetes and baseline DQOL satisfaction score. The DAS also

Table 2—Regression analyses examining the effect of marital quality on HRQoL

Dependent variable	Marital quality predictors			
	PAIR		DAS	
	β (95% CI)	Partial R^2	β (95% CI)	Partial R^2
PAID	−3.6 (−9.3 to 2.2)	0.030	−0.4 (−0.7, to −0.3)*	0.082
DQOL satisfaction	5.3 (0.3 to 10.2)*	0.089	−0.3 (0.02 to 0.6)*	0.086
DQOL impact	−0.3 (−3.7 to 3.1)	0.001	−0.1 (−0.3 to 0.1)	0.012
PANAS positive	0.02 (−0.41 to 0.45)	0.001	0.01 (−0.01 to 0.04)	0.012
PANAS negative	−0.04 (−0.32 to 0.24)	0.002	0.01 (−0.02 to 0.02)	0.002
SF-36 physical	−0.3 (−3.7 to 3.1)	0.001	0.11 (−0.06 to 0.27)	0.035
SF-36 mental	3.6 (−0.2 to 7.5)	0.071	0.14 (−0.09 to 0.37)	0.033

In addition to controlling for baseline quality of life, education was used as an adjustment variable when predicting PAID, DQOL satisfaction, and PANAS negative, whereas the DQOL satisfaction and PANAS positive and negative models controlled for family history of diabetes. * $P \leq 0.05$.

significantly predicted scores on the PAID ($\beta = -0.4, P \leq 0.05$), with greater marital adjustment at T1 predicting less diabetes-related distress at T2 after controlling for the baseline PAID score. Diabetes impact and overall HRQoL, as measured by the PANAS and SF-36, were not predicted by either of the marital measures. In terms of metabolic control, neither the DAS ($P = 0.960$) nor the PAIR ($P = 0.804$) at T1 predicted HbA_{1c} at T2. We also computed change scores, i.e., change in HbA_{1c} from T1 to T2, but again we found that neither of the marital measures predicted change in HbA_{1c}. Additionally, no baseline subject variables predicted change in HbA_{1c}.

CONCLUSIONS— The previous cross-sectional study suggested that a relationship exists between aspects of the marital relationship and HRQoL for individuals with diabetes. However, conclusions were limited by the correlational nature of the data. Data collected from these prospectively studied patients indicate that individuals who described a better overall marital adjustment and higher levels of perceived marital intimacy at one time point reported less diabetes-related distress and greater satisfaction with varied aspects of their own adaptation to the illness (e.g., treatment, appearance, and activities) a full 2 years later. Thus, this study provides stronger support for the hypothesis that a better marital relationship results in better adaptation to diabetes and diabetes-related quality of life.

The marital quality measures predicted diabetes-specific distress, i.e., the psychological domain of HRQoL. Diabetes satisfaction questions broadly address psychological, social, and interpersonal functioning as it relates to diabetes. The physical function domain and more general HRQoL were not predicted by these variables.

The fact that marital measures did not predict overall HRQoL, as measured by the SF-36 and PANAS, is interesting. We believe this finding highlights the value of using diabetes-specific quality of life measures, which may be more sensitive to the emotional and physical challenges associated with the disease. Also, it may mean that marital domains are especially relevant to issues specific to the disease of diabetes. The impact of marital support may be particularly strong in diabetes management, where spouses typically are

involved in many of the required health-care activities, such as keeping track of and administering medications, buying and preparing foods, and performing regular exercise (16). However, it may be that overall HRQoL is more stable than diabetes-specific quality of life. Also, because the SF-36 and PANAS ask about the previous 4 weeks, whereas the DQOL and PAID ask about current status, this finding may reflect the different time frames of the assessments.

As noted in our previous paper, marital role theory (35) helps us further understand the relationship we have observed. This theory posits that marital role strain develops when expectations are not met and when the couple does not adapt to new situations. The need to adjust to a chronic illness like diabetes requires significant life adaptations for both the patient and the spouse. Both patients and spouses will often adjust their eating patterns, food choices, and attention to medications and will be required to make various lifestyle changes. When this occurs within an intimate and supportive marriage, the couple will work as a team to make these adjustments and thus enhance the adaptation of the partner with diabetes, as each will likely feel supported by the other. However, when these adjustments must occur within a distant and less satisfying relationship, the conflict that can develop may contribute to a poorer adjustment to the illness for the patient and poorer quality of life.

The failure to find a relation between marital quality and HbA_{1c} may be due to a lack of power. However, given that our cross-sectional data found only a trend, and the fact that there are many factors that impact HbA_{1c} (e.g., degree of insulin resistance and diet), a relationship is unlikely.

The ability to follow participants over 2 years is a significant strength of this study. However, there are limitations. The small sample size may have limited the power to detect significant relationships between both marital or subject variables and HRQoL or HbA_{1c}. Similarly, the use of generic marital quality measures (not specific to diabetes) may have missed potential relations. However, it is provocative that significant associations were found 2 years later, even after adjusting for HRQoL at T1. Also, we chose to study both type 1 and type 2 diabetic subjects who were being treated with insulin,

an approach adopted by others (36,37). This is based on the assumption that insulin-treated individuals face unique challenges (i.e., frequent and regular blood-glucose testing, insulin injection, and potential for hypoglycemia), compared with diabetes patients who manage their illness by dietary control and oral medication. The psychosocial effect of these challenges is lost when we only compare patients by diabetes type. In fact, diabetes type was not found to be a significant predictor of any of the HRQoL measures we used. However, by thus defining our sample, we limit the generalizability of our findings to the group of insulin-treated individuals. Similarly, the mean duration of diabetes of 16.9 years and mean marriage of 19.2 years suggests that our findings may have been different if participants had been diagnosed and/or married for a shorter period of time. Finally, our subjects report an average of 2.9 comorbid medical conditions, which may mean that they were more or less ill than other diabetes patients. It will be important to try to replicate these findings at other sites.

This study provides prospective evidence that marital quality predicts diabetes-related quality of life. Patients have told us that their partners matter, and these prospective quantitative data support the cross-sectional findings. The marital relationship can be a major support or a significant source of stress. Yet, actively involving the partner to maximize appropriate support is still a rare clinical strategy. This study lends support to the recommendation (10) that we also focus our clinical interventions on the patient's social environment. Interventions that aim to help the partner be appropriately supportive will likely improve quality of life and illness adaptation.

References

1. *Quality of Life Assessment in Clinical Trials: Methods and Practice*. Staquet MJ, Hays RD, Fayers PM, Eds. Oxford, Oxford University Press, 1998
2. Bowling A: *Measuring Health: A Review of Quality of Life Measurement Scales*. Philadelphia, Open University Press, 1997
3. Polonsky WH: Understanding and assessing diabetes-specific quality of life. *Diabetes Spectrum* 13:36–41, 2000
4. Rubin RR, Peyrot M: Psychosocial problems and interventions in diabetes. *Diabetes Care* 15:1640–1657, 1992

5. Lloyd CE, Matthews KA, Wing RR, Orchard TJ: Psychosocial factors and complications of IDDM. *Diabetes Care* 15:166–172, 1992
6. Lustman PJ, Anderson RJ, Freedland KE, DeGroot M, Carney RM, Clouse RE: Depression and poor glycemic control: a meta-analytic review of the literature. *Diabetes Care* 23:934–942, 2000
7. Nouwen A, Gingras J, Talbot F, Bouchard S: The development of an empirical psychosocial taxonomy for patients with diabetes. *Health Psychol* 16:263–271, 1997
8. Anderson RM, Fitzgerald JT, Wisom K, Davis WK, Hiss RG: A comparison of global versus disease-specific quality-of-life measures in patients with NIDDM. *Diabetes Care* 20:299–305, 1997
9. Testa MA, Simonson DC, Turner RR: Valuing quality of life and improvements in glycemic control in people with type 2 diabetes. *Diabetes Care* 21 (Suppl. 3): C44–C52, 1998
10. Fisher L, Chesla CA, Bartz RJ, Gilliss C, Skaff MA, Sabogal F, Kanter RA, Lutz CP: The family and type 2 diabetes: a framework for intervention. *Diabetes Educ* 24: 599–602, 1998
11. Cardenas L, Vallbona C, Baker S, Yusim S: Adult onset diabetes mellitus: glycemic control and family function. *Am J Sci Med* 293:28–33, 1987
12. Garay-Sevilla ME, Nara LE, Malacara JM, Huerta R, Diaz de Leon J, Mena A, Fajardo ME: Adherence to treatment and social support in patients with NIDDM. *J Diabetes Complications* 9:81–86, 1995
13. Primomo J, Yates BC, Woods NF: Social support for women during chronic illness: the relationship among sources and types of adjustment. *Res Nurs Health* 13: 153–161, 1990
14. Schwartz LS, Coulson LR, Toovy D, Lyons JS, Flaherty JA: A biopsychosocial treatment approach to the management of diabetes mellitus. *Gen Hosp Psychiatry* 13: 19–26, 1991
15. Trief PM, Grant W, Elbert K, Weinstock RS: Family environment, glycemic control, and the psychosocial adaptation of adults with diabetes. *Diabetes Care* 21:241–245, 1998
16. Coyne JC, Smith DA: Couples coping with a myocardial infarction: a contextual perspective on patient self-efficacy. *J Fam Psychol* 8:43–54, 1994
17. Hannum JW, Giese-Davis J, Harding K, Hatfield AK: Effects of individual and marital variables on coping with cancer. *J Psychosoc Oncol* 9:1–20, 1991
18. Gilden JL, Hendryx M, Casia C, Singh SP: The effectiveness of diabetes education programs for older patients and their spouses. *J Am Ger Soc* 37:1023–1030, 1989
19. Wing RR, Marcus MD, Epstein LH, Jawad AA: A family based approach to the treatment of obese type II diabetic patients. *J Consult Clin Psych* 59:156–162, 1991
20. Klausner EJ, Koenigsberg HW, Skolnick N, Chung H, Rosnick P, Pelino D, Campbell R: Perceived familial criticism and glucose control in IDDM. *Int J Mental Health* 24:64–75, 1995
21. Trief PM, Himes CL, Orendorff R, Weinstock RS: The marital relationship and psychosocial adaptation and glycemic control of individuals with diabetes. *Diabetes Care* 23:1384–1389, 2001
22. Spanier GB: Measuring dyadic adjustment: new scales for assessing the quality of marriage and similar dyads. *J Marriage Fam* 38:15–27, 1976
23. Locke HJ, Wallace KM: Short marital adjustment prediction tests: their reliability and validity. *Marriage Fam Living* 21:251–255, 1957
24. Schafer MT, Olson DH: Assessing intimacy: the PAIR Inventory. *J Marriage Fam Ther* 7:47–60, 1981
25. Quittner AL, Espelage DL, Opiari LC, Carter B, Eid N, Eigen H: Role strain in couples with and without a child with a chronic illness: associations with marital satisfaction, intimacy and daily mood. *Health Psychol* 17:112–124, 1998
26. Jacobson AM, Samson JA, DeGroot M: The evaluation of two measures of quality of life in patients with type 1 and type 2 diabetes. *Diabetes Care* 17:267–274, 1994
27. Polonsky WH, Anderson BJ, Lohrer PA, Welch G, Jacobson AM, Schwartz C: Assessment of diabetes-related distress. *Diabetes Care* 18:754–760, 1995
28. Welch GW, Jacobson AM, Polonsky WH: The Problem Areas in Diabetes scale: an evaluation of its clinical utility. *Diabetes Care* 20:760–766, 1997
29. Weinger K, Kinsley BT, Bajaj M, Levy C, Simonson DC, Jacobson HM: Quality of life predictors of glycemic control during intensive treatment in type 1 diabetes. *Ann Behav Med* 20:S118, 1998
30. The DCCT Research Group: Reliability and validity of a diabetes quality-of-life measure for the Diabetes Control and Complications Trial (DCCT). *Diabetes Care* 11:725–732, 1988
31. Watson D, Clark LA, Tellegen A: Development and validation of brief measures of positive and negative affect: the PANAS Scale. *J Pers Soc Psychol* 54:1063–1070, 1988
32. Ware JE, Sherbourne CD: The MOS 36-item Short Form Health Survey (SF-36). I. Conceptual framework and item selection. *Med Care* 30:473–483, 1992
33. Ware JE, Kosinski M, Keller SD: *SF-36 Physical and Mental Health Summary Scales: A User's Manual*. Boston, The Health Institute, New England Medical Center, 1994
34. McHorney CA, Ware JE, Lu JFR, Sherbourne CD: The MOS 36-item Short Form Health Survey (SF-36). III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Med Care* 32:40–66, 1994
35. Tharp RG, Otis GD: Toward a theory of therapeutic intervention in families. *J Consult Psychol* 30:426–434, 1966
36. Peyrot M, McMurry JF: Psychosocial factors in diabetes control: adjustment of insulin-treated adults. *Psychosom Med* 47:542–557, 1985
37. Meadows K, Steen N, McColl E, Eccles M, Shiels C, Hewison J, Hutchinson A: The Diabetes Health Profile (DHP): a new instrument for assessing the psychosocial profile of insulin requiring patients: development and psychometric evaluation. *Qual Life Res* 5:242–254, 1996