

Interpersonal Predictors of HbA_{1c} in Patients With Type 1 Diabetes

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OBJECTIVE— Research suggests that increased collaboration and satisfaction in the patient-provider relationship is associated with better outcomes in patients with diabetes. In adults, an interpersonal style characterized by low trust of others and excessive self-reliance is known as “dismissing attachment style.” We hypothesized that diabetic patients with dismissing attachment style, due to a decreased ability to collaborate with providers and others, would have significantly higher HbA_{1c} levels than patients with secure attachment style.

RESEARCH DESIGN AND METHODS— From 276 adult tertiary care patients with type 1 diabetes, we obtained mean HbA_{1c} levels over the prior year and assessed patient attachment style, demographics, and clinical characteristics. We used χ^2 tests and logistic regression to determine whether attachment style was associated with HbA_{1c} levels.

RESULTS— We found that 62% of patients with dismissing attachment style had mean HbA_{1c} levels $\geq 8\%$ compared with 34% of patients with secure attachment style ($P = 0.002$). After adjusting for demographics, diabetes severity, medical comorbidity, and depression, dismissing attachment style remained significantly associated with HbA_{1c} levels $\geq 8\%$, compared with secure attachment style (odds ratio 2.5, 95% CI 1.1–6.0).

CONCLUSIONS— We have found that dismissing attachment style is associated with a higher risk for poor glycemic control. This has relevance from a population-based perspective because ~25% of the general population has a dismissing attachment style. Attachment style is easily measured using self-report instruments and may inform clinicians how to work with patients who are less engaged in the health care relationship.

Diabetes Care 25:731–736, 2002

The Diabetes Control and Complications Trial and the U.K. Prospective Diabetes Study have emphasized the importance of achieving optimal glycemic control in patients with type 1 and type 2 diabetes through strict adherence to medications, glucose monitoring, diet, and exercise in order to minimize long-term complications (1,2). Achieving strict adherence may be challenging for many patients because diabetes is one of the most psychologically and behaviorally demanding of chronic medical illnesses (3),

in which 95% of management is conducted by the patient (4). Due to the complexity of managing diabetes, it is necessary for most diabetic patients to regularly depend on others for support in optimizing management of diabetes self-care regimens.

One important source of support for chronically medically ill patients is obtained in the health care setting. A positive collaboration between patient and provider has been found to be associated with improved patient participation in

their care (5–7), improved treatment adherence and outcomes (5,7–9), fewer cancellations and failures to attend appointments (10), and increased negotiation and compromise about treatment (11). In diabetes, patient satisfaction with the patient-provider relationship is significantly associated with better adherence to treatment (12) and metabolic control (13).

Motivational approaches to diabetes treatment, such as self-determination theory (14), suggest that patients are more likely to adhere to treatment if they perceive providers as understanding their perspective, acknowledging their feelings, and offering choices in treatment. A key aspect of this patient-centered approach may be the provider's recognition of the patient's interpersonal style. Health care communication investigators are beginning to emphasize that measuring how the patient perceives and engages in relationships might be as important as focusing primarily on provider communication variables, but that such patient variables are less frequently investigated (15).

Attachment theory is a systematic way of understanding patients' perceptions of and ability to collaborate in health care relationships. In developing attachment theory, John Bowlby proposed that all individuals psychologically incorporate prior experiences with caregivers, forming enduring cognitive models or “maps” of caregiving that persist into adulthood (16). Such models are learned ways of interacting in interpersonal relationships throughout life and particularly at times of vulnerability (e.g., illness). These models influence whether individuals deem themselves worthy of care and whether others are perceived as trustworthy to provide care. Recent studies have shown high stability and continuity of attachment models between infancy and adolescence (17) and infancy and adulthood (18). Based on empirical research in infants, children, and adults over the past 3 decades, social psychologists (19) have identified four specific patterns of interpersonal attachment behaviors in adults: secure, dismissing, preoccupied, and fearful.

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Received for publication 17 August 2001 and accepted in revised form 14 December 2001.

Abbreviations: DCC, Diabetes Care Center; RSQ, Relationship Scales Questionnaire; RQ, Relationship Questionnaire; SCL-90-R, Symptom Checklist-90, Revised.

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

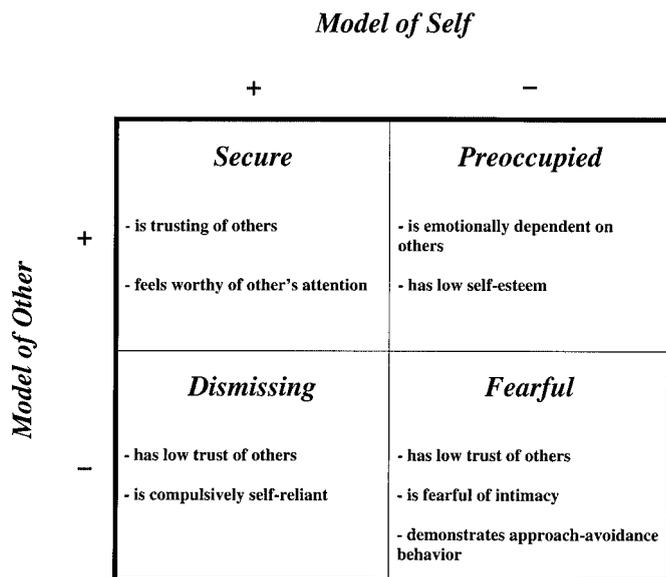


Figure 1—Attachment style categories and model of self and other (adapted from ref. 19).

Adults with secure attachment are generally believed to have experienced consistently responsive (20) early caregiving (in the process developing a positive view of self and others) (see Fig. 1) and are generally comfortable depending on and being readily comforted by others. Adults with dismissing attachment are believed to have experienced early caregiving that was largely consistently emotionally unresponsive, and as a result, from an early age, they develop strategies in which they become compulsively "self-reliant" (19) (resulting in a positive view of self) but are uncomfortable trusting others (resulting in a negative view of others). On the other hand, adults with preoccupied attachment experienced inconsistently responsive caregiving (21), so in an effort to ensure proximity to caregivers, they learn to do more than their share in attachment relationships. As a consequence, they are generally emotionally dependent on others' approval (resulting in a positive view of others), often to the point of being "clingy," but generally have poor self-esteem (a negative view of self). Individuals with fearful attachment share many of the characteristics of those with preoccupied attachment in that they desire social contact (i.e., they are not excessively self-reliant), but this desire is inhibited by fear of rejection. These individuals are proposed to have had overly critical or harsh rejecting caregiving (they have a negative view of self and others) and as adults are more likely

to demonstrate approach-avoidance behavior interpersonally stemming from a fear of intimacy (22).

We posited that the compulsive self-reliance characterizing individuals with dismissing attachment is largely incompatible with the type of successful collaboration between patient and provider that has been shown to be associated with good outcomes in patients with chronic illness (5). In the current study, we hypothesized that type 1 diabetic patients with dismissing attachment style would have significantly poorer adherence to treatment, as indicated by higher HbA_{1c}, as compared with diabetic patients with secure attachment style.

RESEARCH DESIGN AND METHODS

This cross-sectional observational study was carried out at the University of Washington Diabetes Care Center (DCC), Seattle, Washington. Eligible participants included all English-speaking DCC patients, aged ≥ 18 years, already enrolled in both 1998 and 1999. Potential subjects with severe cognitive or language deficits were excluded. In July 1999, 826 potential subjects were sent an approach letter briefly describing the study. Then, 2 weeks later, subjects were sent a questionnaire and consent form that fully explained the study and requested permission for a review of their automated records. Subjects not returning the questionnaire within 3 weeks were sent an identical second questionnaire

and consent form. Subjects received a \$3 compensation for their time in participating in the study. The questionnaire and all patient correspondence were approved by the University of Washington institutional review board. Because this study is building on prior research that had already explored the impact of attachment styles in a primary care population of predominantly type 2 diabetic patients (23), and because the majority of patients in the DCC are type 1 diabetic patients, this study reports analyses that focus only on type 1 diabetic patients from this clinic.

Self-report instruments

Attachment style. Two related instruments measuring attachment style were used. The 30-item Relationship Scales Questionnaire (RSQ) (24) and the 4-item Relationship Questionnaire (RQ) (24) are valid and reliable instruments. RSQ and RQ results were combined by averaging z-transformed continuous data to derive continuous measures of the four attachment styles, from which attachment style was determined categorically for each subject based on the attachment category with the highest score (25). Continuous measures of 1) model of self, 2) model of other, and 3) overall security were determined using the following methods, respectively: 1) subtraction of the preoccupied and fearful scores from the sum of secure and dismissing scores; 2) subtraction of the dismissing and fearful scores from the sum of secure and preoccupied scores; and 3) subtraction of the average of the three insecure scores (dismissing, preoccupied, and fearful attachment) from the secure score.

Depression. The Hopkins Symptom Checklist-90, Revised (SCL-90-R) (26) is a self-report instrument that has been validated in previous studies of medical patients and has been found to be highly reliable. The 20 items from the depression and additional symptom subscales were used in the current study.

Diabetes complications. Patients were given a score from 0 to 3 to reflect the number of the following self-reported diabetes complications: retinopathy, nephropathy, and peripheral neuropathy (27), which has been shown to be highly correlated with ratings of severity of diabetes from independent physicians ($r = 0.72$, $P < 0.001$) (27).

Diabetes knowledge. The Diabetes Knowledge Assessment (DKN) is a valid

Table 1—Characteristics of type 1 diabetes patients by attachment style

	Secure attachment	Dismissing attachment	Preoccupied attachment	Fearful attachment	P	Post hoc differences
n	100	55	60	52		
Female sex	56	49	54	56	NS	
Caucasian race	97	95	93	90	NS	
Attended at least 1 year college	95	91	88	83	NS	
Annual household income \geq \$40,000	78	62	64	52	0.009	S>F,P,D
Married	81	67	62	52	0.002	S>F,P,D
Significant depressive symptoms present*	6	15	18	25	0.01	P,F>S
Age (years)	43.0 \pm 14.6	45.3 \pm 14.1	38.8 \pm 11.5	39.2 \pm 12.4	0.03	D>P
Diabetes knowledge score (% correct)	97 \pm 7	95 \pm 10	97 \pm 7	96 \pm 8	NS	
Mean number of medical conditions	1.1 \pm 1.4	1.6 \pm 1.6	1.6 \pm 1.5	2.1 \pm 1.8	0.005	F>S
Mean number of diabetes complications (retinopathy, neuropathy, and nephropathy)	0.66 \pm 0.97	0.89 \pm 0.96	0.79 \pm 1.06	1.19 \pm 1.16	0.03	F>S
Mean HbA _{1c} level (%)	7.5 \pm 1.1	8.0 \pm 1.2	7.8 \pm 1.4	8.1 \pm 1.5	0.03	F>S

Data are % or means \pm SD, unless otherwise indicated. *Score >1.72 on the 20 items from the SCL-90-R depression and additional symptoms subscales. D, dismissive attachment; F, fearful attachment; P, preoccupied attachment; S, secure attachment.

and reliable 15-item instrument that assesses patient knowledge about diabetes and its treatment (28).

Medical comorbidity. Based on the methods of Wells et al. (29), we estimated medical comorbidity by having patients complete a checklist of medical conditions from a total of 18, giving a count of 0, 1, 2, or >2 chronic medical conditions.

Demographic and clinical data were determined from questionnaire responses (race, education, income, and marital status) and from automated data (age, sex, and diabetes type). We also used automated data to determine mean HbA_{1c} values for each subject from the preceding 12 months. Mean number of HbA_{1c} tests in this population was two per year (range 0–6). To analyze HbA_{1c} levels, the University of Washington DCC uses a Bayer DCA2000, which is certified by the National Glycohemoglobin Standardization Program as having documented traceability to the Diabetes Control and Complications Trial reference method.

Statistical analysis

We analyzed data using SPSS 10.0 for Windows. We used two-tailed *t* tests or χ^2 tests with corrections for continuity to compare respondents and nonrespondents on age and sex after obtaining the appropriate human subjects' approval to use aggregate data of nonrespondents on these variables. We compared demographic and clinical variables in respondents between attachment groups using

ANOVA or χ^2 tests with corrections for continuity.

To determine whether HbA_{1c} levels varied as a function of attachment style, we conducted ANOVA. We then determined whether the percentage of patients with HbA_{1c} levels $\geq 8\%$ were different between attachment style categories using a χ^2 test. We chose this cutoff for HbA_{1c} because current clinical guidelines recommend additional clinical action for patients whose HbA_{1c} levels fall within this range (30). To account for potential confounders associated with diabetes self-care, we conducted a logistic regression to determine whether the percentage of patients with HbA_{1c} levels $\geq 8\%$ were different between attachment style categories after adjusting for covariates that were specifically different between attachment groups, such as demographics, medical comorbidity, diabetes complications, diabetes knowledge, and depression.

Finally, we conducted Pearson correlations to examine the relationship within all subjects between HbA_{1c} levels and continuous measures of the four attachment styles (the degree of each attachment style in each patient's global attachment), model of self, model of other, and overall security (Fig. 1). Model of self indicates the degree to which a person has internalized a sense of self-worth (positive) versus feeling anxious and uncertain (negative) about one's self-worth. Model of other indicates the degree to which others are generally expected to be

available and supportive and is associated with the tendency to seek out (positive) or avoid (negative) closeness in relationships.

RESULTS— Of 826 patients, 475 (58%) responded to the survey, of which 276 (58%) were type 1 diabetic subjects. There were no significant differences in age and sex between respondents and nonrespondents. Demographic and clinical characteristics of respondents by attachment style category are shown in Table 1. Age, income, marital status, level of depression, number of medical conditions, and number of diabetes complications were significantly different between groups and were included as covariates in subsequent logistic regression.

There was a significant attachment style effect on HbA_{1c} levels [*F* (3,224) = 2.988, *P* = 0.03] (Table 1). Post hoc Tukey's honestly significant difference test (*P* < 0.05) revealed that patients with fearful attachment had significantly higher (mean \pm SD) HbA_{1c} levels (8.1 \pm 1.5%) compared with patients with secure attachment (7.5 \pm 1.1%). There was a trend level difference in HbA_{1c} levels (*P* = 0.1) between secure and dismissing attachment (8.0 \pm 1.2%).

When the proportion of patients in each attachment style group with HbA_{1c} levels $\geq 8\%$ was assessed, there was a significant overall effect (χ^2 = 10.4, *df* = 3, *P* = 0.02). Of the patients, 62% with dismissing attachment style had HbA_{1c} lev-

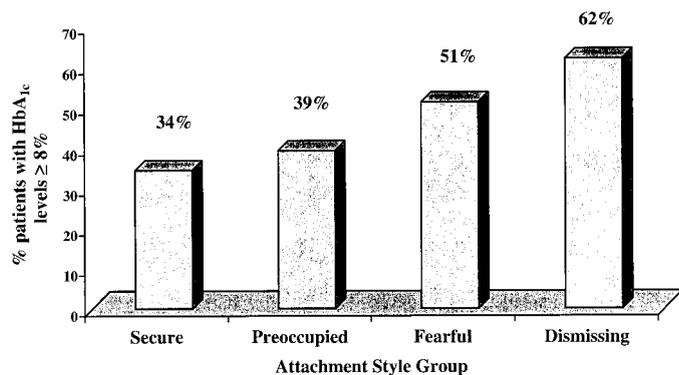


Figure 2—Relationship between HbA_{1c} levels and attachment style in patients with type 1 diabetes.

els $\geq 8\%$ as compared with 34% of the patients with secure attachment ($\chi^2 = 9.27$, $df = 1$, $P = 0.002$) and 39% of patients with preoccupied attachment ($\chi^2 = 4.74$, $df = 1$, $P = 0.03$) (see Fig. 2). Although 50% of the patients with fearful attachment had HbA_{1c} levels $\geq 8\%$, this did not differ significantly from the other three groups.

In a logistic regression in which we adjusted for age, income, marital status, depression, medical comorbidity, and number of diabetes complications, we found that patients with dismissing attachment remained significantly more likely to have HbA_{1c} levels $\geq 8\%$ than patients with secure attachment (odds ratio 2.5, 95% CI 1.1–6.0). There were no other significant differences between attachment groups.

To determine the relationship between HbA_{1c} levels and continuous measures within individuals of the four attachment styles, model of self, model of other, and overall security, we conducted Pearson correlations, which showed that HbA_{1c} values were negatively correlated with secure attachment style and positively correlated with dismissing and fearful attachment (Table 2).

CONCLUSIONS— Significantly more type 1 diabetic patients with dismissing attachment had HbA_{1c} levels $\geq 8\%$ as compared with patients with secure attachment. Dismissing and fearful attachment styles, which are associated with reluctance or fear of relying on others, were significantly correlated with higher HbA_{1c} levels. Our analyses, in which we control for factors such as marital status, income, and diabetes complications, are probably conservative. In

fact, all three of these covariates may be similarly influenced by the patient's lack of ability to interact in adaptive ways with people that they must rely on, such as spouses, work supervisors, or clinicians.

The differences in HbA_{1c} levels between patients with dismissing and fearful compared with secure attachment are likely to be clinically important. The Diabetes Control and Complications trial has provided conclusive evidence that strict glycemic control in patients with type 1 diabetes can both delay the onset of microvascular complications and slow the rate of progression of already established complications. Moreover, a curvilinear relationship was found between the risk of complications, such as retinopathy and HbA_{1c} levels, once there was departure from HbA_{1c} levels of ~ 7 –8% to higher levels (31). Another study that measured both albumin excretion and glycemic control in 1,613 patients with type 1 dia-

Table 2—Relationship between HbA_{1c} levels and continuous measures of attachment styles, model of self, model of other, and overall security in patients with type 1 diabetes

	Mean HbA _{1c} level (%)
Secure attachment	-0.17*
Dismissing attachment	0.15†
Preoccupied attachment	0.11
Fearful attachment	0.19*
Model of self‡	-0.13
Model of other§	-0.18*
Overall security	-0.21*

$N = 228$. * $P < 0.01$ (two-tailed); † $P < 0.05$ (two-tailed); ‡positivity indicates less anxiety about relationships; §positivity indicates more trust in relationships.

betes found that the risk of having microalbuminuria increased abruptly at HbA_{1c} values $> 8.1\%$ (32).

Through the use of short self-report questionnaires, attachment theory can inform clinical care by providing a framework by which clinicians can potentially improve adherence to treatment in disengaged patients. This is important from a population-based perspective, since across studies, including the National Comorbidity Survey (33), the prevalence of dismissing attachment is $\sim 25\%$ in the general population. Based on our clinical experience and attachment theory, we envision two approaches that clinicians can use to better interact with disengaged or challenging patients.

First, by learning about the different attachment styles, clinicians may become more empathic and less frustrated when they find themselves in challenging patient-provider relationships. In fact, attachment theory offers a nonpejorative, developmentally based framework for better understanding both sides of the dyad in patient-provider interactions.

In a second, more structured approach, providers within a clinic may adapt to ensure provision of good care, but on the "patient's terms," which may mean accepting and working with a patient's attachment style. In practical terms, clinicians can decrease the relative interpersonal threat that patients with dismissing and fearful attachment encounter in more intimate clinical settings by taking on a "businesslike," but patient-centered, interactive style or by having a small number of clinic providers, rather than a single clinician, alternately providing coordinated care for the patient. Additionally, regularly coordinated telephone contact with these patients may be necessary to ensure continuity in the clinical relationship while maintaining a less interpersonally threatening clinical context. Unfortunately, patients with dismissing and fearful attachment may otherwise maladaptively opt for irregular visits with multiple providers in emergency rooms, urgent care clinics, and inpatient settings. This inconsistent pattern of health care utilization may put these individuals at higher risk for delaying medical care for significant medical symptoms and for raising costs of care. Ongoing health services research that uses the attachment construct for understanding patients who

are disengaged from treatment is needed to improve clinical interventions.

There are several limitations of this study. This study is cross-sectional in design, and causal inferences pertaining to HbA_{1c} levels and attachment style cannot be made. Attachment style, however, is a relatively stable trait (17,18), and it is unlikely that nonadherence to diabetes treatment alters attachment style. Furthermore, because the attachment instrument assesses interpersonal relationship past and present and does not focus on the patient-provider relationship, it is unlikely that the quality of the patient-provider relationship significantly influences patients' responses to the attachment questionnaire.

Another possible limitation of this study is the potential lack of generalizability of this predominantly white, educated, employed, and insured tertiary care population to other settings. Particularly at issue here may be the smaller degree of socioeconomic barriers to treatment in this sample compared with a truly representative national sample. Relatedly, we had a response rate of 58%, which may also influence generalizability of these results, even though we were able to show no respondent bias based on age and sex. Finally, we cannot rule out the possibility that patients with dismissing or fearful attachment who have poorer adherence to diabetes self-care may have also been less likely to fill out our study questionnaire.

Although we had data in our current sample from 199 type 2 diabetic patients, a power analysis based on our previous study of predominantly (97%) type 2 diabetic patients in a health maintenance organization primary care setting (23) showed that we were significantly underpowered to find differences in HbA_{1c} levels in type 2 diabetic patients, making it unfeasible to perform separate analyses and comparisons with type 2 diabetic patients in this study. The sample sizes required to detect HbA_{1c} values 0.5% higher among diabetic patients with dismissing attachment as compared with those with secure attachment, using a two-tailed test and $\alpha = 0.05$, were 502 total patients at 90% power and 374 patients at 80% power. Despite the difference in predominant diabetes type between the two studies, the results in the current analyses replicate our previous findings, in which we found that dismissing attachment was associated with

higher HbA_{1c} levels and, when patients also perceived that patient-provider communication was poor, with lower adherence to oral hypoglycemic agents and to glucose monitoring (23).

Interestingly, despite many potential differences between primary and tertiary care samples, in both studies we found similar proportions of attachment styles among respondents, similar outcomes (HbA_{1c} values in patients with secure and dismissing attachment were 7.5 ± 1.2 and $8.0 \pm 1.5\%$, respectively, in the primary care study), and almost identical diabetes complication rates among patients. Regardless of whether receiving care in a primary or tertiary setting is an important factor influencing the patient-provider relationship, health behaviors and diabetes outcomes should be explored using an attachment perspective in future studies.

Although we are also planning further qualitative studies to better understand patient-provider interactions in the diabetes setting, Dozier and Tyrrell (34) have shown that dismissing attachment among patients is associated with greater rejection of treatment providers, less self-disclosure, and poorer use of treatment in the mental health setting. They have also shown that case managers of chronically mentally ill patients who themselves had more secure attachment styles were more likely to attend and respond to their clients' underlying needs, whereas those who had higher levels of insecure attachment responded only to the most obvious presentation of clients' needs (34). The interaction between the attachment style of a diabetologist or primary care provider and their diabetic patients is an area that warrants further investigation.

In prior research, we have also shown that a patient's inability to rely on others (e.g., dismissing or fearful attachment) is significantly associated with less medical use in diabetes and general medical settings (35,36). The paradox is that these are patients who providers may want to follow more closely because of high HbA_{1c} levels, but scheduling clinic appointments may not work well as a result of arousing patient concerns and vulnerabilities about over-reliance on providers. To improve self-management in diabetes populations, we plan to test proven population-based methods that will take into account these patients' needs to overly maintain self-reliance, such as the use of registries for population-based tracking

to prevent patients from "falling through the cracks," the use of telephone contacts or appointments, and the use of proactive contacts, surveillance, and reminders to keep disengaged patients involved in their own health care.

Acknowledgments—This study was supported by Group Health Cooperative/Kaiser Permanente Community Foundation Grant 66-0404 and Bayer Institute for Health Care Communication Grant 98-439.

The authors thank Anthony D'Amico and Larry Mix for their assistance with collection of data for this study.

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