DEVELOPMENT AND VALIDATION OF THE DIABETES CARE PROFILE

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To determine the reliability and the validity of the Diabetes Care Profile (DCP), an instrument that assesses the social and psychological factors related to diabetes and its treatment, two studies with separate populations and methodologies were conducted. In the first study, the DCP was administered to, and physiologic measures collected from, individuals with diabetes being cared for in a community setting (n = 440). In the second study, the DCP and several previously validated scales were administered to individuals with diabetes receiving care at a university medical center (n = 352). Cronbach's alphas of individual DCP scales ranged from .60 to .95 (Study 1) and from .66 to .94 (Study 2). Glycohemoglobin levels correlated with three DCP scales (Study 1). Several DCP scales discriminated among patients with different levels of disease severity. The results of the studies indicate that the DCP is a reliable and valid instrument for measuring the psychosocial factors related to diabetes and its treatment.

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INTRODUCTION

Diabetes is a disorder where the body cannot use glucose properly. There are two types of diabetes: insulin dependent diabetes mellitus (IDDM) and noninsulin dependent diabetes mellitus (NIDDM). Patients with IDDM produce little or no insulin (the hormone that allows the body to use sugar for energy) and require daily injections of insulin for treatment. IDDM usually occurs in children and adults under the age of 30. Patients with NIDDM produce inadequate amounts of insulin or are resistant to its action. NIDDM is managed through diet and exercise, pills, or, in more severe cases, daily insulin injections. NIDDM usually occurs in adults over the age of 40 and who are overweight.

The results of the Diabetes Control and Complications Trial (a multicenter clinical trial to test blood glucose control and complications of IDDM) support the use of intensive therapy to reduce the risk of complications for persons with insulin dependent diabetes mellitus (The DCCT Research Group, 1993). It is also believed that intensive therapy will similarly benefit persons with noninsulin dependent diabetes mellitus (Harris, Eastman, & Siebert, 1994). Self-care in the treatment of diabetes requires considerable time and effort from the patient (Speelman-Rhiley, 1993); intensive therapy increases these demands by requiring more frequent monitoring of blood glucose and multiple daily insulin injections. As diabetes care moves toward intensive therapies, health-care professionals must be able to assess the willingness and ability of patients to accept and execute more intensive regimens.

Following diabetes therapies and recommendations usually requires significant changes in a patient's lifestyle. The Diabetes Care Profile (DCP) is an instrument designed to measure the social and psychological factors important in a patient's adjustment to diabetes and its treatment. These factors are related to a patient's self-care behavior and thus may influence an individual's ability and willingness to provide diabetes self-care (Glasgow & Osteen, 1992; Rubin & Peyrot, 1992). For example, a previous study using a different instrument found that self-reported adherence levels were related to atti-

tudes toward diabetes (Anderson, Fitzgerald, & Oh, 1993). Determining and examining the social and psychological obstacles (whether real or perceived) of diabetes self-care is an initial step in overcoming these obstacles.

The value of instruments specific to diabetes as opposed to more general health questionnaires has been demonstrated. Jacobson, DeGroot, and Samson (1994) reported that a diabetes-specific quality-of-life measure was more sensitive to lifestyle issues of individuals with diabetes than a generic quality-of-life survey. Several data collection instruments have been developed for use with individuals with diabetes. These instruments have focused on the quality of life of individuals of diabetes (Bradley & Lewis, 1990; Jacobson et al., 1994; The DCCT Research Group, 1988), the social and environmental barriers to regimen adherence (Glasgow & Toobert, 1988; Irvine, Saunders, Blank, & Carter, 1990), family support (McKelvey et al., 1993), attitudes toward diabetes and self-care (Wikblad, Wibell, & Montin, 1990), and the health beliefs of individuals with diabetes (Harris, Linn, Skyler, & Sandifer, 1987; Lewis, Jennings, Ward, & Bradley, 1990). The DCP is unique because of its comprehensive coverage of the social and psychological aspects of diabetes and its treatment.

DEVELOPMENT OF THE DIABETES CARE PROFILE (DCP)

The DCP is a self-administered questionnaire specific to diabetes. The instrument contains 234 items encompassing seven sections that measure social and psychological factors related to diabetes and its treatment. The DCP also contains questions concerning demographic information and self-care practices. Respondents can complete the questionnaire in approximately 30 to 40 minutes.

The Diabetes Care Profile evolved from an earlier instrument called the Diabetes Educational Profile (DEP). The DEP was developed to document the social, psychological, and educational needs of patients with diabetes (Davis, Hess, Harrison, & Hiss, 1987). This instrument was based on the Health Belief Model (HBM) (Janz & Becker, 1984)

and included items that measure each of the four major constructs of the model: perceived severity of the disease, perceived susceptibility to complications, benefits of adherence, and barriers to adherence. The HBM was first applied to diabetes in 1980 in a study that related diabetes regimen compliance to health beliefs (Cerkoney & Hart, 1980; Ludvigsson, Richt, & Svensson, 1980). Subsequent studies reported relationships between compliance and (a) belief in the severity of the illness and (b) a diabetes belief scale (Harris & Linn, 1985; Harris et al., 1987). Other studies have shown the importance of health beliefs in regimen adherence (Brownlee-Duffeck et al., 1987) and demonstrated the usefulness of the HBM in determining the readiness of patients to self-manage their diabetes (Hurley, 1990).

Derived from the DEP and embedded in the DCP are 14 scales representing important facets of patient adjustment to diabetes: control problems, social and personal factors, positive attitude, negative attitude, self-care ability, importance of care, self-care adherence, diet adherence, medical barriers, exercise barriers, monitoring barriers, understanding management practice, long-term care benefits, and support attitudes. Factor analysis of data obtained with the DEP was used to identify clusters of items related both in content and patient response patterns. Further analysis of this factor matrix using the promax [4] algorithm determined the solution most representative of the simple structure of the DEP. An examination of item content within each identified factor confirmed the appropriateness of the constructs represented in the empirically determined structure. Results of a confirmatory analysis of data obtained from a separate study yielded strong support for the earlier factor analysis across all factors (Hess, Davis, & Harrison, 1986).

Scale content of the DCP reflects the general structure of the DEP. Additional items that assess the respondents' management regimen were added to the DCP. Coefficient alpha and stepwise item-total correlations were used to confirm final scale content and as an estimate of scale reliability.

The 14 DCP scales examined in the study, a sample item from each scale, the scoring range, the interpretation of the endpoints, and the number of items in each scale are provided in Table 1. These scales

TABLE 1
Scoring and Sample Items for the Diabetes Care Profile Scales

Diabetes Care Profile Scale	*Scoring*		*No. of Items*	*Sample Item*
	Good	*Poor*		
Control problems	1	5	18	During the past year, how often have you had changes in your blood sugar (too high) because you were sick or had an infection?
Social and personal factors	1	5	13	How often has your diabetes kept you from doing your normal daily activities during the past year?
Positive attitude	5	1	5	I feel satisfied with my life.
Negative attitude	1	5	6	I am afraid of my diabetes.
Self-care ability	5	1	4	I am able to keep my blood sugar in good control.
Importance of care	5	1	4	I think it is important for me to keep my blood sugar in good control.
Self-care adherence	5	1	4	I keep my blood sugar in good control.
Diet adherence	5	1	4	(If told to diet) How often do you follow a meal plan or diet?
Medical barriers	1	5	8	How often do you change the timing and/or dose of your insulin or diabetes pills because you missed an earlier dose?
Exercise barriers	1	5	5	How often do you have trouble getting enough exercise because you are too busy?
Monitoring barriers	1	5	11	When you do not test for sugar as often as you have been told, how often is it because you forgot?
Understanding mgt. practice	5	1	10	How do you rate your understanding of diet and blood sugar control?
Long-term care benefits	5	1	5	Taking the best possible care of diabetes will delay or prevent eye problems.
Support attitudes	5	1	6	My family and friends accept me and my diabetes.

assess the patients' diabetes attitudes (e.g., the positive attitude and the support attitude scales), diabetes beliefs (e.g., the importance of care and the long-term benefits scales), adherence to diabetes self-care (e.g., the self-care adherence and the diet adherence scales), and the difficulties of diabetes self-care (e.g., the medical barriers and the exercise barriers scales).

PURPOSE OF THE STUDY

Fundamental to the management of diabetes is patient self-care. Some of the most serious and expensive complications of diabetes can be prevented or delayed with proper self-care. Because diabetes self-care can also have a major impact on a patient's lifestyle, adherence to some of the components of diabetes self-care has been poor (Kurtz, 1990). Assessing the social and psychological factors of diabetes is important in understanding, establishing, and maintaining self-care. The DCP is an instrument that can assist in understanding these factors. To establish the DCP's utility, two research questions are addressed in this study:

1. Are the Diabetes Care Profile scales reliable?
2. Are the Diabetes Care Profile scales valid?

Reliability refers to the consistency of the responses to the individual items within each scale. Scale reliabilities were calculated using Cronbach's coefficient alpha (Cronbach, 1951).

The DCP scales were examined for both construct validity and concurrent validity. Construct validity is an estimate of the extent to which an instrument is measuring qualities that it is intended to measure. Construct validity can be determined by the ability of the DCP scales to differentiate among patient groups. Although the three patient groups (patients with IDDM, patients with NIDDM using insulin, and patients with NIDDM not using insulin) share many commonalties, each is unique (Hiss, Anderson, Hess, Stepien, & Davis, 1994). If the scales are valid, patient responses will differ by diabetes type and treatment. Because few studies have examined

differences by type and treatment, it is difficult to advance specific hypotheses about these relationships. However, we hypothesized that the more severe the disease (i.e., the greater impact on a patient's daily life), the more difficulty the patient will have or perceive in providing self-care. For the purpose of this study, patients with IDDM were assumed to have a more severe form of diabetes than patients with NIDDM, and patients with NIDDM using insulin were assumed to have a more severe form of diabetes than patients with NIDDM not using insulin. For scales such as control problems, we expected patients with IDDM to report the most problems, followed by patients with NIDDM using insulin. Patients with NIDDM not using insulin were expected to report the fewest problems. Similarly, we hypothesized that the more severe the disease, the more importance the patient would assign to self-care. For scales such as importance of care, we expected patients with IDDM to give higher scores than patients with NIDDM, and patients with NIDDM using insulin to give higher scores than patients with NIDDM not using insulin.

Further evidence of construct validity can be ascertained from correlations of the DCP scales to the physiologic measure of glycosylated hemoglobin (GHb). GHb is a blood test that measures a patient's average blood glucose level for the past 2 to 3 months. Scales designed to measure self-care ability, self-care adherence, and control problems should correlate with level of metabolic control.

Concurrent validity is demonstrated when an external, previously validated scale measuring a similar construct correlates with the scale in question. Concurrent validity was tested by calculating correlations of the DCP scales with scales external to the DCP.

STUDY DESIGN

Two different studies were used to estimate the reliability and validity of the DCP, each using separate populations and methodologies. In the first study, the DCP was administered to individuals with diabetes being cared for in a community setting. Physiologic measures were collected at the time the DCP was administered and the results

correlated to the DCP scale scores. In the second study, the DCP and several previously validated scales were administered to individuals with diabetes receiving care at an academic medical center.

STUDY 1: THE COMMUNITY STUDY

PURPOSE

The community study addressed the Diabetes Care Profile's reliability and construct validity using a sample of patients with diabetes being cared for in community settings throughout Michigan. Physiologic measures collected from the patients at the time they completed the DCP allowed determination of scale validity against disease/control variables.

HYPOTHESES

Three hypotheses were tested in the community study:

1. The DCP scale scores are reliable, that is, the responses to the individual scale items are internally consistent.
2. DCP scale scores that measure control, attitudes, barriers, benefits, patient adherence, and social support will differ according to diabetes type and treatment (see Table 2).
3. DCP scale scores that measure control, attitudes, barriers, benefits, patient adherence, and social support will correlate with patients' blood glucose control (GHb levels; see Table 2).

SAMPLE

The community sample was drawn from eight communities in Michigan. Eligible participants were selected to represent individuals with diabetes being cared for by physicians in community settings (Hiss et al., 1994). Initially, 1,017 patients with diabetes aged 21 years old or older were invited to participate in the study. Responses on

TABLE 2
Diabetes Care Profile Validation Hypotheses—Summary Table

	Study 1: Community Study				*Study 2: Medical Center Study*							
	Diabetes Type and Treatment Differences[a]		*GHb Level Correlation*[b]		*Diabetes Type and Treatment Differences*[a]		*Social Provisions Scale Correlation*[c]		*CES Depression Scale Correlation*[c]		*Happiness and Satisfaction Scale Correlation*[c]	
Diabetes Care Profile Scale	*Expected*	*Found*	*Expected*	*Found*	*Expected*	*Found*	*Expected*	*Found*	*Expected*	*Found*	*Expected*	*Found*
Control problems	√	√	√	√	√	√			√	√		
Social and personal factors	√	√	√		√	√	√	√	√	√	√	
Positive attitude	√	√	√		√			√	√	√	√	√
Negative attitude	√		√		√			√	√	√	√	
Self-care ability	√		√	√	√				√	√	√	√
Importance of care	√		√		√							
Self-care adherence	√		√	√	√					√		
Diet adherence	√		√		√							
Medical barriers	√	√	√		√	√						
Exercise barriers			√									
Monitoring barriers	√	√	√		√					√		
Understanding mgt. practice	√	√	√		√	√		√				
Long-term care benefits			√									
Support attitudes	√		√		√		√	√	√	√	√	

a. For each scale, at least one difference was expected among the following three patients groups: patients with IDDM, patients with NIDDM using insulin, and patients with NIDDM not using insulin.

b. Correlations ≥ .20 were considered significant.

c. Correlations ≥ .30 were considered significant.

returned postcards to project staff were received from 517 individuals who agreed to participate. Data were collected from 440 individuals; the remaining individuals were either too ill to participate or no longer interested in participating.

Eleven percent of the sample were patients with IDDM, 34% were patients with NIDDM using insulin, and 55% were patients with NIDDM not using insulin. Participant ages ranged from 22 to 95 years old; the average age (± the standard deviation) was 61±13 years old. Average age at onset of diabetes was 51 years, while the time since diagnosis averaged 10 years. Fifty-five percent of the sample were women, 32% had 13 or more years of formal education, and 58% had participated in some form of diabetes education.

INSTRUMENTS/DATA COLLECTION

Study subjects received the Diabetes Care Profile, a general history form, a diabetes history form, a test of diabetes knowledge, and a 24-hour diet recall. Participants were given a physical examination and had blood samples drawn to determine GHb levels.

METHODS

The DCP was initially self-administered. A trained interviewer subsequently reviewed the questionnaire with each patient to ensure that each item had been answered. GHb-level determinations were made in the core laboratories of the Michigan Diabetes Research and Training Center by using the Gyc-Affin GHb test kit.

The hypotheses were tested by three analyses. The reliability of each DCP scale was determined by Cronbach's coefficient alpha calculated on standardized scores. Scale differences among the patients with IDDM, patients with NIDDM using insulin, and patients with NIDDM not using insulin were determined using analysis of variance (F ratio $p \leq .01$) and Tukey's HSD (global alpha = .05). Correlations of the DCP scales to GHb levels were examined by pairwise Pearson correlations. Correlations of $\geq .20$ were considered supportive of construct validity.

TABLE 3
Scale Reliabilities

Scale	*Community Study Reliability*	*Medical Center Study Reliability*
Control problems	.86	.86
Social and personal factors	.85	.90*
Positive attitude	.80	.80
Negative attitude	.77	.75
Self-care ability	.72	.74
Importance of care	.90	.90
Self-care adherence	.70	.70
Diet adherence	.87	.89
Medical barriers	.75	.75
Exercise barriers	.60	.66
Monitoring barriers	.65	.77*
Understanding mgt. practice	.92	.92
Long-term care benefits	.95	.94
Support attitudes	.69	.73

*Using Fisher's Z transformation, reliability differs between samples at $p \leq .01$.

RESULTS

DCP SCALE RELIABILITIES

The DCP scale reliabilities for the community study are presented in Table 3. The reliabilities range from a low of .60 (exercise barriers) to a high of .95 (long-term care benefits).

SCALE DIFFERENCES AMONG DIABETES TYPE AND TREATMENT GROUPS

The validity of the DCP was hypothesized to be supported if the scales were capable of discriminating among patient groups. Table 4 provides the comparison of the DCP scales among patients with IDDM, patients with NIDDM using insulin, and patients with NIDDM not using insulin. There were significant differences among the three patient groups for 6 of the 14 DCP scales. All three groups scored differently on the scales control problems and understanding management practice. Patients with NIDDM not using insulin reported fewer

TABLE 4
Community Study's DCP Scales Means by Diabetes Type and Treatment

Scale	*IDDM*	*NIDDM Insulin*	*NIDDM No Insulin*
	Mean ± SD (n)	*Mean* ± SD (n)	*Mean* ± SD (n)
Control problems	2.41±.62 (48)	1.93±.62 (128)	1.68±.65 (134)[a]
Social and personal factors	2.06±.68 (50)	1.98±.72 (148)	1.66±.60 (242)[b]
Positive attitude	3.35±.88 (50)	3.26±.74 (148)	3.50±.85 (242)[c]
Negative attitude	2.27±.85 (50)	2.39±.82 (148)	2.37±.82 (242)
Self-care ability	3.65±.61 (50)	3.40±.82 (146)	3.46±.92 (231)
Importance of care	4.42±.53 (50)	4.28±.72 (148)	4.37±.54 (242)
Self-care adherence	3.66±.59 (49)	3.42±.83 (147)	3.46±.80 (240)
Diet adherence	2.99±1.02 (42)	2.97±.91 (126)	2.86±.96 (164)
Medical barriers	1.68±.50 (50)	1.23±.39 (148)	1.15±.35 (159)[d]
Exercise barriers	1.77±.66 (47)	1.84±.73 (146)	1.74±.76 (238)
Monitoring Barriers	1.64±.58 (39)	1.33±.43 (120)	1.55±.55 (66)[e]
Understanding mgt. practice	3.64±.76 (45)	3.29±.76 (108)	2.86±.81 (101)[a]
Long-term care benefits	4.20±.89 (50)	4.28±.69 (148)	4.13±.74 (242)
Support attitudes	4.01±.62 (50)	3.87±.64 (144)	3.76±.61 (227)

a. All three patients groups differ, $p = .05$.

b. Patients using insulin differ from patients with NIDDM not using insulin, $p = .05$.

c. Patients with NIDDM using insulin differ from patients with NIDDM not using insulin, $p = .05$.

d. Patients with IDDM differ from patients with NIDDM, $p = .05$.

e. Patients with NIDDM using insulin differ from patients with IDDM and patients with NIDDM not using insulin, $p = .05$.

control problems. Patients with IDDM had the best understanding of their self-care.

Patients with NIDDM not using insulin reported less impact on their social and personal life (social and personal factors) than patients using insulin. Patients with NIDDM not using insulin also reported more positive outlook (the positive attitude scale) than patients with NIDDM using insulin.

Patients with IDDM stated more difficulty in following their insulin regimen (the medical barriers scale) than patients with NIDDM in following their insulin or oral medication. Patients with NIDDM using insulin reported the fewest problems with monitoring (the monitoring barriers scale).

TABLE 5
Correlations Between GHb Level and the DCP Scales for the Community Study

Scale	*Correlation*	(n)
Control problems	.21*	(310)
Social and personal factors	.17*	(440)
Positive attitude	−.16*	(440)
Negative attitude	.17*	(440)
Self-care ability	−.33*	(427)
Importance of care	−.03	(440)
Self-care adherence	−.28*	(436)
Diet adherence	−.15*	(332)
Medical barriers	.13	(357)
Exercise barriers	.14*	(431)
Monitoring barriers	.13	(225)
Understanding mgt. practice	.04	(254)
Long-term care benefits	.05	(440)
Support attitudes	.01	(421)

*$p \leq .01$.

CORRELATIONS BETWEEN THE DCP SCALES AND GHb LEVELS

It was hypothesized that several DCP scales would correlate with GHb levels (see Table 2). In this study, GHb levels averaged 10.2 mg% and ranged from 4.6 to 24.7 mg% (normal values are from 4 to 8 mg%). Patients with IDDM had the highest average GHb levels (11.2), followed by patients with NIDDM using insulin (11.0) and patients with NIDDM not using insulin (9.5). The correlations between GHb level and the DCP scales for the entire sample are presented in Table 5.

Three scales were significantly correlated (correlations ≥ .20) with GHb level: control problems, self-care ability, and self-care adherence. For control problems, patients reporting the greatest difficulty also had the higher GHb levels. For self-care ability and self-care adherence, patients reporting greater ability and adherence had lower GHb levels.

When the correlations were examined by type of diabetes and treatment, the correlation between GHb level and the DCP scale of self-care adherence remained significant for each of the three patient groups. The correlation between GHb level and control problems was

significant for patients with NIDDM not using insulin, whereas the correlation between GHb level and self-care ability was significant for both patient groups with NIDDM.

Additional significant correlations were found for patients with NIDDM not using insulin. In this group of patients, GHb levels were positively correlated to social and personal factors (problems), negative attitude, and medical barriers.

STUDY 2: THE MEDICAL CENTER STUDY

PURPOSE

The medical center study examined the DCP's reliability, construct validity, and concurrent validity by using a sample of patients with diabetes selected from patients receiving care in a large academic medical center. Correlations of DCP scales with scores on previously validated scales allowed an estimate of the DCP's concurrent validity. DCP scale scores were also analyzed to determine differences in scale scores by diabetes type and treatment regimen. Scale reliabilities were calculated to determine internal consistency.

HYPOTHESES

The medical center study tested three hypotheses:

1. The DCP scale scores are reliable, that is, the responses to the individual scale items are internally consistent.
2. Selected DCP scale scores will correlate with external, validated scales that measure similar constructs (see Table 2).
3. DCP scale scores that measure control, attitudes, barriers, benefits, patient adherence, and social support will differ according to diabetes type and treatment (see Table 2).

SAMPLE

The medical center sample was drawn from patients with diabetes seen at the University of Michigan Medical Center during an 18-

month period (1990-1991). Only adult patients 21 years of age and older were included. Fifteen hundred individuals were sent an initial form letter requesting their willingness to participate in the survey. Five hundred seventy-six individuals (38%) responded to this inquiry and were sent a questionnaire. Of the questionnaires sent, 428 questionnaires (74%) were returned. From the returned questionnaires, 352 were complete and used for this study. There was no follow-up mailing nor were there attempts to fill in missing data by additional contacts with the subjects.

The medical center sample was evenly divided by diabetes type and treatment: 33% of the sample were patients with IDDM, 34% were patients with NIDDM using insulin, and 33% were patients with NIDDM not using insulin. Participant ages ranged from 21 to 90 years old; the average age (± the standard deviation) was 54±16 years old. Average age at onset of diabetes was 39 years and the time since diagnosis averaged 14 years. Sixty percent of the sample were women, 44% had 13 or more years of formal education, and 84% had completed some form of diabetes education.

INSTRUMENTS/DATA COLLECTION

The medical center sample completed the DCP and three external, previously validated scales: the social provisions scale, the Center for Epidemiologic Studies depression scale (CES-D), and the happiness and satisfaction scale. No physiologic data were obtained.

The three external scales (see Table 6) were selected because they measure constructs similar to the DCP scales but without a diabetes focus. The social provisions scale assesses the perceived availability of social support (Cutrona & Russell, 1987; Mancini & Blieszner, 1992). Scores range from 1 to 4 and represent the mean response to 24 items. Higher scores indicate higher levels of social support.

The CES-D (Radloff, 1977) scores range from 0 to 60 and represent the sum of the responses to 20 items. Higher scores are associated with a greater level of depression.

The happiness and satisfaction scale corresponds to Bryant and Veroff's life dissatisfaction index (Bryant & Veroff, 1986). The score

TABLE 6
Scoring and Sample Items for the External Validating Scales

Scale	Scoring		No. of Items	Sample Item
	Good	Poor		
Social provision	4	1	24	There are people I can depend on to help me if I really need it.
CES depression	0	60	20	I was bothered by things that usually don't bother me.
Happiness and satisfaction	4	1	5	(How much satisfaction have you gotten from . . .) First, consider things you do in your leisure time.

is the average response to five items. The score ranges from 1 to 4, with higher scores indicating greater satisfaction.

METHODS

To determine reliability, Cronbach's coefficient alpha was calculated on the standardized scores for each scale. The second hypothesis was tested using pairwise Pearson correlations to determine the relationship of the DCP scales with patient responses to the three external, validated instruments. Correlations of $\geq .30$ were considered indicative of concurrent validity. Because a large number of correlations were examined (85 for the overall sample), a p level of $\leq .01$ was selected.

The third hypothesis was tested by determining scale differences among patients by diabetes type and treatment using analysis of variance (F ratio $p \leq .01$) and Tukey's HSD (global alpha = .05).

RESULTS

DCP AND EXTERNAL SCALE RELIABILITIES

The DCP scale reliabilities for the medical center sample are presented in Table 3. The reliabilities ranged from a low of .66 (exercise barriers) to a high of .94 (long-term care benefits).

TABLE 7
Medical Center Study's DCP Scales Means by Diabetes Type and Treatment

Scale	*IDDM* *Mean* ± SD (n)	*NIDDM Insulin* *Mean* ± SD (n)	*NIDDM No Insulin* *Mean* ± SD (n)
Control problems	2.44±.59 (91)	2.04±.63 (90)	1.90±.71 (79)[a]
Social and personal factors	2.78±.91 (95)	2.63±.80 (97)	2.32±.86 (91)[b]
Positive attitude	3.08±.92 (94)	3.05±.79 (98)	3.30±.92 (93)
Negative attitude	2.29±.92 (95)	2.49±.81 (98)	2.50±.69 (93)
Self-care ability	3.31±.82 (95)	3.10±.83 (98)	3.33±.85 (93)
Importance of care	4.49±.53 (95)	4.30±.67 (98)	4.42±.50 (92)
Self-care adherence	3.66±.68 (94)	3.44±.76 (98)	3.48±.72 (92)
Diet adherence	3.21±1.01 (86)	3.11±.95 (90)	3.14±.93 (73)
Medical barriers	1.84±.53 (88)	1.34±.45 (93)	1.31±.45 (50)[a]
Exercise barriers	2.15±.86 (89)	2.14±.95 (87)	1.91±.75 (88)
Monitoring barriers	1.61±.68 (18)	1.65±.70 (32)	1.73±.60 (32)
Understanding mgt. practice	3.98±.82 (88)	3.43±.82 (81)	3.39±.85 (70)[a]
Long-term care benefits	4.14±1.03 (95)	4.15±.86 (97)	4.29±.72 (93)
Support attitudes	4.01±.71 (94)	3.94±.67 (92)	3.86±.72 (91)

a. Patients with IDDM differ from patients with NIDDM, $p = .05$.
b. Patients using insulin differ from patients with NIDDM not using insulin, $p = .05$.

The previously validated scales were also reliable measures. In the sample, the Cronbach's alphas were .93 for the social provisions scale, .90 for the CES-D, and .76 for the happiness and satisfaction scale.

SCALE DIFFERENCES AMONG DIABETES TYPE AND TREATMENT GROUPS

DCP scale comparisons among patients with IDDM, patients with NIDDM using insulin, and patients with NIDDM not using insulin are provided in Table 7. There are differences for 4 of the 14 DCP scales among these patient groups. Patients with IDDM reported more control problems, more difficulty following their insulin regimen (medical barriers), and a better understanding of their self-care. Diabetes had less impact on the social and personal life of patients with NIDDM not using insulin than patients using insulin (social and personal factors).

TABLE 8
Correlations Between the DCP Scales and External Scales/Indexes for the Medical Center Study

DCP Scale	*Social Provisions Scale Correlation*	(n)	*CES Depression Scale Correlation*	(n)	*Happiness and Satisfaction Scale Correlation*	(n)
Control problems	−.06	(274)	.34*	(266)	−.20*	(245)
Social and personal factors	−.33*	(297)	.48*	(289)	−.27*	(267)
Positive attitude	.32*	(300)	−.53*	(292)	.32*	(271)
Negative attitude	−.34*	(301)	.48*	(293)	−.14	(271)
Self-care ability	.26*	(301)	−.42*	(293)	.30*	(271)
Importance of care	.24*	(300)	−.15*	(292)	.14	(270)
Self-care adherence	.23*	(298)	−.35*	(290)	.23*	(269)
Diet adherence	.13	(260)	−.10	(252)	.14	(236)
Medical barriers	−.03	(242)	.14	(238)	−.10	(218)
Exercise barriers	−.23*	(277)	.21*	(269)	−.19*	(247)
Monitoring barriers	−.16	(85)	.32*	(81)	−.23	(78)
Understanding mgt. practice	.32*	(248)	−.15	(242)	.11	(222)
Long-term care benefits	.18*	(300)	−.09	(292)	.24*	(270)
Support attitudes	.51*	(291)	−.35*	(285)	.25*	(263)

*$p \leq .01$.

CORRELATIONS BETWEEN THE DCP SCALES AND THE EXTERNAL SCALES

It was hypothesized that specific DCP scales would correlate with external scales measuring similar constructs (see Table 2). Table 8 presents the correlations between the DCP scales and the selected external scales: the social provisions scale, the CES-D, and the happiness and satisfaction scale.

The social provisions scale was expected to correlate with two DCP scales: (a) a negative correlation was hypothesized with the DCP social and personal factors scale and (b) a positive correlation was hypothesized with the DCP support attitudes scale. These two scales, as well as three other DCP scales, were found to be significantly correlated (correlations $\geq .30$ and $p \leq .01$) with the social provisions scale. The social provisions scale was negatively correlated with the scale of social and personal factors and the scale of negative attitude. The social provisions scale was positively correlated with the DCP scales of positive attitude, understanding of management practice, and support attitudes.

It was hypothesized that the CES-D would correlate positively with (a) control problems, (b) social and personal factors, and (c) negative attitude. Negative correlations were expected with (a) positive attitude, (b) self-care ability, and (c) support attitudes. Each of these correlations was found to be significant in the expected direction and provide support for concurrent validity. In addition, the CES-D correlated positively with monitoring barriers and negatively with self-care adherence.

The happiness and satisfaction scale was expected to correlate positively with (a) positive attitude, (b) self-care ability, and (c) support attitudes. Negative correlations were expected with (a) social and personal factors and (b) negative attitude. Only two of the expected correlations were significant. The happiness and satisfaction scale had positive correlations with positive attitude and self-care ability. The other DCP scales expected to correlate (support attitudes, social and personal factors, and negative attitude) did not do so at the .30 or higher level; however, all did correlate in the expected direction.

DISCUSSION

The goal of the two studies was to determine the reliability and validity of the social and psychological scales of the DCP. The reliability estimates calculated in the two studies suggest that the DCP scales are reliable measures. The scale reliabilities in the two studies were similar, with the exceptions of the social and personal factors and the monitoring barrier scales (the reliability of the medical center sample is slightly higher than that for the community sample, .90 vs. .85 for the social and personal factors scale and .77 vs. .65 for the monitoring barrier scale, $p \leq .01$). The variances for these two scales are larger in the medical center sample than in the community sample (Levene's homogeneity of variance test, $p = .05$) and most likely contributes to the medical center's higher reliabilities. The larger variability in the medical center is attributed to a more diverse patient group (i.e., a greater percentage of patients with IDDM and patients with NIDDM using insulin than is found in the community sample).

Both studies support the DCP's validity. The results of the comparisons indicate that the DCP scales differ by diabetes type and treatment (see Table 4 and Table 7). Hypothesized differences were confirmed. For example, it was expected that the more severe the disease, the more difficulty patients would have in controlling their diabetes. Indeed, self-reported control problems were greatest for patients with IDDM followed by patients with NIDDM using insulin. Furthermore, patients using insulin (a more intrusive self-care procedure than taking pills) reported a greater impact of diabetes on their social and personal lives. The DCP is sensitive to the differences among the three patient groups. The direction of score differences across patient groups support the DCP's validity.

Construct validity is further supported by DCP scale correlations with GHb levels in Study 1. Because many factors impact GHb levels, only moderate correlations (correlations between .20 and .50) were expected between GHb levels and the DCP scales. Although only three of the DCP scales correlated with GHb levels, these three scales (control problems, self-care ability, and self-care adherence) dealt directly with self-care and correlated in the expected direction. An interesting aspect of the GHb/DCP scale correlations is the fact that patients with NIDDM not using insulin had the most significant correlations (6, whereas patients with IDDM had 1 and patients with NIDDM using insulin had 2). The reasons for this are unclear and will need to be explored further.

In Study 2 (medical center), the correlations of the previously validated scales to specific DCP scales support concurrent validity. Although the focus of the DCP is on diabetes, patient responses correlated in the expected direction with more general scales of social support and well-being. The social provisions scale correlated with the support attitudes scale; the more patients feel social support is available, the more positive they are about the diabetes-specific support they receive from family and friends. The social provisions scale also correlated with the social and personal factors scale; the more positive patients are about available support, the less impact diabetes is perceived to have on their social and personal lives. In addition to the hypothesized correlations, the social provisions scale correlated with three additional DCP scales. The scale was positively correlated

with positive attitude and understanding of management practice, and negatively correlated with the scale of negative attitude. All three correlations are reasonable; the more positive patients are about available support, the more positive they are about their diabetes and the better their understanding of self-care.

The hypothesized correlations between the DCP and the CES-D were also found. As levels of depression increased, patients reported greater difficulty in controlling their diabetes (control problems), a greater impact of diabetes (social and personal factors), and a more negative view of life (negative attitude). As depression scores decreased, patients reported more positive life views (positive attitude), higher levels of ability to conduct diabetes self-care (self-care ability), and more positive ratings of support received from family and friends (support attitudes). Two correlations with the CES-D were not hypothesized. The scale was negatively correlated with self-care adherence and positively correlated with the scale of monitoring barriers. Both correlations are reasonable: Lower depression scores are correlated with higher self-care adherence and fewer problems with monitoring.

Only two of the five hypothesized correlations between the DCP and the happiness and satisfaction scale were supported. However, all five of the correlation coefficients were in the expected direction.

CONCLUSIONS

The reliability and validity of the DCP were supported in both the community and the academic medical center studies, suggesting that the DCP is applicable to patients treated in a variety of settings. In addition, the DCP provides specific information about factors that influence diabetes control that cannot be captured with more general measures.

The utility of the DCP for research purposes has been demonstrated. Future research that includes the DCP should focus on testing theoretical frameworks that describe patient adjustment to diabetes and to therapeutic regimens. The DCP could also be used as a baseline measure in intervention studies. As a baseline measure, the ability of

the researchers to use scale scores to develop and assign appropriate interventions could be tested. Selected scales within the DCP could also be used as outcome measures to test the impact/effectiveness of interventions on patient control, social functioning, impact of diabetes, and so on.

Although these studies support the research use of the DCP, further research is needed to establish its utility in clinical settings. The scales that focus on self-care, barriers, control, and benefits may be useful in patient care. However, whether these scales could be extracted from the DCP, given independently and still maintain scale reliability and validity, has yet to be determined.

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