The Diabetes Empowerment Scale

A measure of psychosocial self-efficacy

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OBJECTIVE — The purpose of this study was to assess the validity, reliability, and utility of the Diabetes Empowerment Scale (DES), which is a measure of diabetes-related psychosocial self-efficacy.

RESEARCH DESIGN AND METHODS — In this study (n = 375), the psychometric properties of the DES were calculated. To establish validity, DES subscales were compared with 2 previously validated subscales of the Diabetes Care Profile (DCP). Factor and item analyses were conducted to develop subscales that were coherent, meaningful, and had an acceptable coefficient α.

RESULTS — The psychometric analyses resulted in a 28-item DES (α = 0.96) with 3 subscales: Managing the Psychosocial Aspects of Diabetes (α = 0.93), Assessing Dissatisfaction and Readiness To Change (α = 0.81), and Setting and Achieving Diabetes Goals (α = 0.91). Consistent correlations in the expected direction between DES subscales and DCP subscales provided evidence of concurrent validity.

CONCLUSIONS — This study provides preliminary evidence that the DES is a valid and reliable measure of diabetes-related psychosocial self-efficacy. The DES should be a useful outcome measure for various educational and psychosocial interventions related to diabetes.

Diabetes Care 23:739–743, 2000

Patients with diabetes must make a series of daily decisions involving nutrition, physical activity, medication, blood glucose monitoring, and stress management. Patients must also interact effectively with the health care system, their family members, friends, and employers to obtain the support necessary to manage their diabetes (1). Thus, enhancing the perceived self-efficacy of patients to self-manage their diabetes is an important goal of diabetes care and education.

Perceived self-efficacy has become an important and useful construct in psychology (2–4) because it is related to the willingness and the ability of people to engage in various behavioral challenges including preventive and disease management behaviors (5–15). Studies in diabetes have demonstrated the effect of perceived self-efficacy on the adherence behavior of adolescents (16,17), African-American women with diabetes (18), adults with complex insulin regimens (18,19), and adults with type 1 or type 2 diabetes (20–22). However, in these studies, self-efficacy has been defined primarily as the perceived ability to engage in various situation-specific self-management tasks such as blood glucose monitoring and ordering meals in a restaurant, or the studies have focused on the needs of particular group of patients (e.g., adolescents).

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Received for publication 2 August 1999 and accepted in revised form 15 February 2000.

Abbreviations: DCP, Diabetes Care Profile; DES, Diabetes Empowerment Scale.

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

In 1991, we conducted a randomized controlled trial to evaluate the effectiveness of a patient empowerment program for adults that focused entirely on psychosocial issues such as managing stress, obtaining family support, negotiating with health care professionals and employers, and dealing with uncomfortable emotions (23). Because we were unable to identify a measure of diabetes-related self-efficacy for adults that focused on these important psychosocial areas, we developed the Diabetes Empowerment Scale (DES), which is a 37-item Likert-type questionnaire (24), and we used it in that study. The study showed that the program resulted in both psychosocial and blood glucose level improvements.

RESEARCH DESIGN AND METHODS

Instrument development

The pilot version of the DES had 8 subscales that were keyed to the major content areas of the patient empowerment and education program (23,24). The structure of the DES and the patient empowerment program were based on our earlier work in patient empowerment (25–27). In an earlier study (25), we defined the purpose of the empowerment approach to diabetes education as helping patients make informed choices about their diabetes self-management. In that study, we offered a 4-step behavior change model: *1*) patient identification of problem areas, *2*) exploration of the emotions associated with those problems, *3*) development of a set of goals and strategies to overcome the barriers to achieving those goals, and *4*) determining patients' motivation to make a commitment to the behavior change plan. That approach to facilitating behavior change in diabetic patients was adapted from earlier work in counseling psychology (28–31). Most of the patient empowerment program and DES subscales were derived from that behavior change model. The remaining 2 subscales (Managing Stress and Obtaining Psychosocial Support) were added to the patient empowerment program and the DES because these areas have been identified as major barriers and/or facilitators (see the third step above) of

Table 1—*Demographic information for survey respondents (*n = *375)*

Age (years)	50.4 ± 15.8
Men/women	45/55
Type of diabetes	
Type 1	25
Type 2 using insulin	57
Type 2 not using insulin	18
Years since diabetes diagnosis	16.9 ± 10.8
Received diabetes patient education	66
Years of school completed	
Eighth grade or less	2
Some high school	5
High school graduate	21
Some college	73
Ideal body weight (%)	
Men	117.2 ± 244
Women	136.8 ± 38.9

Data are means ± SD or %.

behavior change and psychosocial adaptation to diabetes (32).

In our earlier study (23), the pilot version of the DES was completed before the patient empowerment program, at the completion of the 6-week program, and at a 6-week follow-up visit. Evidence for the validity of the pilot version of the DES was provided by consistent correlations among the pre- and postempowerment program change scores on the DES and change scores on independent measures of positive and negative attitudes toward having diabetes as measured by the Diabetes Care Profile (DCP) (33) and by glycosylated hemoglobin levels. The DCP Positive Attitude and Negative Attitude scales were chosen because they have proven to be consistent and reliable measures of patients' overall psychosocial adjustment to diabetes (34–36). These DCP subscales were also correlated with several the subscales of the Short Form-36, which is a well-known quality-of-life measure (37). We reasoned that an overall measure of psychosocial adjustment to diabetes should correlate with measures of psychosocial self-efficacy. A sample item from the DCP Negative Attitude scale is "I am afraid of my diabetes." A sample from the DCP Positive Attitude scale is "I can do just about anything I set out to do."

Finally, in the earlier study (23), baseline scores on the pilot version of the DES also correlated significantly in the expected direction with patients' self-reported comfort in asking questions of their physician and their self-reported positive adjustment to diabetes (23). A test–retest reliability score of 0.79 for the DES was calculated by correlating the baseline scores of a no-treatment wait-listed control group with the group's scores at the end of the control period 6 weeks later (23).

Because only 3 of the 8 subscales on the pilot version of the DES had internal consistency scores (coefficient α) $\geq$0.80, we reviewed the wording of the items to determine whether we could improve the psychometric properties of the instrument. The items in the pilot version of the DES did not relate the self-efficacy items specifically to diabetes. We reasoned that making each DES item specific to diabetes would be likely to make the DES a more valid and reliable instrument. For example, in the pilot version of the DES, the item worded "In general, I believe that I can choose realistic goals" was changed to read "I can choose realistic diabetes goals."

For the study reported herein, the DES was mailed or given to a convenience sample of patients with diabetes involved in various Michigan Diabetes Research and Training Center outreach programs. The sampling strategy was chosen to ensure that the sample contained an adequate representation of patients with diabetes in terms of sex, age, and type of diabetes to carry out a sound psychometric analysis of the completed DES questionnaires. We did not use multiple mailings or other similar strategies to maximize return rates because our intention was not to generalize the results of this study to a larger group of patients with diabetes.

Statistical methods

A principal components factor analysis was used to identify an empirically derived set of subscales. The factor structure was then rotated using the Varimax method. Factor loadings (the correlations of items with the factors) $\geq$0.50 were considered significant (because of the large sample size, factor loadings of smaller magnitude could be statistically significant) and were used to define factors. An iterative process of factor analyses and item analyses was used to compare forced 6-, 5-, 4-, 3-, and 2-factor solutions. This iterative process was used to identify the smallest number of psychologically coherent and meaningful factors, with the smallest number of items having a coefficient α $\geq$0.80. A Pearson correlation matrix was used to examine relationships among the DES subscales. Pearson correlations were also used to examine the relationships between each DES subscale and the DCP Positive Attitude, Negative Attitude, and Diabetes Understanding scales and level of education.

RESULTS — Table 1 presents demographic information for the patients who completed the questionnaire. The original sample of patients who participated in the earlier patient empowerment program study (23) had significantly more women and patients with type 1 diabetes than the sample in this study. Demographically, the patients in this larger sample more closely resembled the randomly selected cohorts of patients that we have studied in our community-based studies (38,39).

Table 2—*DES subscales*

Subscale	Sample items
Managing the Psychosocial Aspects of Diabetes: This subscale assesses the patients' perceived ability to obtain social support, manage stress, be self-motivating, and make diabetes-related decisions that are "right for me."	"In general, I believe that I can ask for support for having and caring for my diabetes when I need it."
	"In general, I believe that I know what helps me stay motivated to care for my diabetes."
Assessing Dissatisfaction and Readiness to Change: This scale assesses patients' perceived ability to identify aspects of caring for diabetes that they are dissatisfied with and their ability to determine when they are ready to change their diabetes self-management plan.	"In general, I believe that I know what part(s) of taking care of my diabetes that I am dissatisfied with."
	"In general, I believe that I know what part(s) of taking care of my diabetes that I am ready to change."
Setting and Achieving Diabetes Goals: This scale assesses patients' perceived ability to set realistic goals and reach them by overcoming the barriers to achieving their goals.	"In general, I believe that I can choose realistic diabetes goals."
	"In general, I believe that I am able to decide which way of overcoming barriers to my diabetes goals works best for me."

Table 3—*Descriptive statistics for DES subscales (*n = *375)*

Scale name	*n*	Means ± SD (range)	Standardized item α ± SEM	Variance (%)	Eigen value
Managing the Psychosocial Aspects of Diabetes	9	3.91 ± 0.70 (1.44–5.00)	0.93 ± 0.04	45	16.6
Assessing Dissatisfaction and Readiness to Change	9	3.96 ± 0.53 (1.78–5.00)	0.81 ± 0.03	6	2.1
Setting and Achieving Diabetes Goals	10	3.96 ± 0.62 (1.80–5.00)	0.91 ± 0.03	5	1.9

Psychometric tests and scale statistics

A principal components factor analysis yielded 6 factors with eigen values ≥1.0. After examining the various factor solutions, we judged the 3-factor solution to be the best. It yielded a 28-item DES (coefficient α = 0.96) with 3 subscales, which accounts for 56% of the total variance. Factor 1, entitled "Managing the Psychosocial Aspects of Diabetes" (α = 0.93), contains items that describe patients' perceived ability to obtain needed social support, manage diabetes-related stress, be self-motivated, and make diabetes care-related decisions. Factor 2, entitled "Assessing Dissatisfaction and Readiness To Change" (α = 0.81), assesses patients' perceived ability to identify areas of their diabetes self-management plan that are unsatisfactory and to know when they are prepared to make changes in their self-management plans. Factor 3, entitled "Setting and Achieving Diabetes Goals" (α = 0.91), assesses patients' perceived self-efficacy in identifying relevant and achievable diabetes goals and overcoming the barriers to the achievement of those goals. See Table 2 for sample items. Descriptive statistics for the 3 DES subscales are presented in Table 3. The DES subscale correlation matrix is presented in Table 4. The correlations among the subscales range from a low of 0.64 to a high of 0.75.

DES subscales and correlations with validating measures

Moderate correlations were demonstrated between the DES subscales and the 3 validating subscales from the DCP (i.e., Positive Attitude, Negative Attitude, and Diabetes Understanding) (Table 5). The correlations between the 3 DES subscales and the Positive Attitude scale ranged from 0.32 to 0.59; the correlations between the 3 DES subscales and the Negative Attitude scale ranged from 0.38 to 0.59; the correlations between the 3 DES subscales and level of education ranged from 0.10 to 0.17; and the correlations between the 3 DES subscales and the self-reported Diabetes Understanding scale ranged from 0.39 to 0.43.

The correlations with the Positive Attitude scale indicated that the patients reporting greater levels of psychosocial self-efficacy had a more positive outlook about their life and diabetes. The correlations with the Negative Attitude scale indicated that the patients reporting greater levels of psychosocial self-efficacy have a less negative outlook on their life and diabetes. Finally, the DES had positive correlations with the self-reported Diabetes Understanding scale and small positive correlations with level of education. Patients reporting greater levels of psychosocial self-efficacy also report having a better understanding of diabetes.

CONCLUSIONS

Validity and reliability

The study described in this article provides preliminary support for the validity, reliability, and utility of the DES. The content validity of the DES is supported by the fact that it was derived from our previous theoretically based work in patient empowerment. The concurrent validity of the DES is supported by the strength, consistency, and direction of the correlations between the DES subscale scores and the Positive Attitude, Negative Attitude, and Diabetes Understanding subscales of the DCP. Further evidence for the validity and utility of the DES is provided by the positive correlations between improved glycosylated hemoglobin change scores and improved DES subscale change scores found in our earlier study (23).

Preliminary evidence for the test–retest reliability of the DES is provided by the test–retest correlation (0.79) between DES scores when the pilot version instrument was administered to the same group of subjects at the beginning and at the end of the 6-week no-treatment control period. The strength of the intercorrelations among the DES subscales suggests that the instrument is measuring related but separate domains of psychosocial self-efficacy. Each coefficient α for the overall DES and the 3 subscales was good. The somewhat lower-than-expected correlations between DES scores and level of education could be because of lack of variability; 94% of the sample graduated from high school and/or had some college education. The relationship between these variables may be relatively weak. Further study will be required to determine the explanation.

Specificity

An important conceptual issue raised by the DES study is the relationship of psychosocial self-efficacy to diabetes-related health behavior. Previous research related to self-efficacy suggests that, for self-efficacy scores to have a strong predictive value related to particular behaviors, the items must be very specific. However, specificity is not a dichotomous construct but rather is a continuous one. For example, one could ask about a patient's perceived self-efficacy related to exercise by creating items that stated "I am very confident in my ability to: *1*) exercise regularly to improve my blood glucose control, *2*) walk 4 times a week to

Table 4—*Pearson product-moment correlations between DES subscales (*n = *375)*

Scale name	Managing the Psychosocial Aspects of Diabetes	Assessing Dissatisfaction and Readiness to Change
Assessing Dissatisfaction and Readiness to Change	0.67	—
Setting and Achieving Diabetes Goals	0.75	0.64

All correlations are significant at $P < 0.0001$.

Table 5—*Correlations among the DES subscales, the DCP subscales, and education level*

DES subcales	DCP Positive Attitude scale*	DCP Negative Attitude scale*	Education level†§	DCP self-reported Diabetes Understanding scale*‡
Managing the Psychosocial Aspects of Diabetes	0.59 (363)	−0.59 (362)	0.10 (357)	0.43 (364)
Assessing Dissatisfaction and Readiness to Change	0.32 (367)	−0.38 (366)	0.17 (360)	0.39 (368)
Setting and Achieving Diabetes Goals	0.42 (368)	−0.45 (367)	0.11 (361)	0.39 (369)

Data are correlation coefficients (*n*). *n* varies slightly because not every respondent answered every item. *$P >$ 0.001; †education levels: 1, eighth grade or less, 2, some high school, 3, high school graduate, and 4, some college or technical school; ‡scores range from 1 (poor) to 7 (excellent); §$P > 0.05$.

improve my blood glucose control, *3*) walk 2 miles 4 times a week to improve my blood glucose control, and *4*) walk 2 miles in 30 min 4 times a week to improve my blood glucose control."

Previous research related to self-efficacy indicates that the more specifically worded items are more predictive of specific behaviors. However, in our judgment, the DES should be considered a measure of higher-order self-efficacy. Trying to be overly specific in describing perceived ability related to items such as social support, goal setting, and coping with emotions does not make sense to us. We realize that the structure of the DES may limit its ability to predict very specific behaviors. However, in our judgment, the primary purpose and value of the DES will be as a measure of psychosocial self-efficacy viewed as an outcome of successful clinical or educational interventions. We believe it may also be a useful measure of successful adaptation to and self-management of diabetes. Further study will be required to determine whether these assertions will be supported by data.

In summary, these data provide preliminary support that the DES has good potential to add to our understanding of a relatively understudied area of psychosocial adjustment to diabetes, psychosocial self-efficacy. This study provides preliminary support for the reliability and validity of the DES. Further research with different samples of diabetic patients will be required to confirm the factor structure and subscale reliability of the DES. We do not believe that viewing the instrument as "final" is either possible or desirable based on our research to date. We look forward to further research conducted by our own group and other investigators to further explore the validity, reliability, and utility of this new measure.

Acknowledgments — This study was supported in part by National Institutes of Health Grant 5P60-DK-20572 and 5RO1-DK-53994-02.

The DES and permission to use it can be downloaded from www.med.umich.edu/mdrtc.

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