Development of a Reliable and Valid Chinese Version of the Diabetes Empowerment Scale

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OBJECTIVE — To translate the Diabetes Empowerment Scale (DES) into Chinese and establish its psychometric properties among Hong Kong Chinese people.

RESEARCH DESIGN AND METHODS — A two-stage study design, incorporating qualitative and quantitative components, determined the cultural equivalency and content validity of the translated scale and established the psychometric properties of the Chinese DES (C-DES) in 207 patients.

RESULTS — Psychometric analysis supported the reliability and validity of the 20-item Chinese DES (C-DES-20) and five subscales: overcoming barriers ($\alpha = 0.89$), determining suitable methods ($\alpha = 0.79$), achieving goals ($\alpha = 0.78$), obtaining support ($\alpha = 0.78$), and coping ($\alpha = 0.76$). The test-retest reliability of the intraclass correlations was satifactory when a subsample of 20 patients was tested after a 2-week interval. There was criterion validity between the global scale and metabolic control (HbA_{1c}) of respondents with type 2 diabetes ($P = 0.03$).

CONCLUSIONS — The C-DES-20 is a reliable and valid outcome measure for patient education and psychosocial interventions among Hong Kong Chinese people with diabetes.

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Patients with diabetes have to take responsibility for their own care and in the process make many decisions on a daily basis, often with little support and with the burden of having had to overcome social and cultural barriers (1). If the diabetes treatment regimen is to be effective, patients need to actively engage in self-management, and they need to be empowered to accomplish this (2,3). Empowering patients with a sense of control over diabetes is a central theme supported by the World Health Organization, which advocates the importance of fostering psychological well-being as a major outcome (4,5). This shift toward patient empowerment in diabetes education (6,7) is likely to enhance knowledge and cooperation (5,8,9), foster appropriate self-management abilities, and enable patients to overcome some of the personal, social, and environmental barriers that many of them face (10,11). For example, there is evidence that patient empowerment can improve outcomes such as metabolic control and quality of life (8).

Anderson et al. (8), while investigating the application of empowerment with diabetic patients, stated that its purpose was to ensure that patients make informed decisions about their diabetes self-management. Thus, in addition to the knowledge and skills provided by a traditional education program, patients require training in psychosocial skills.

The Diabetes Empowerment Scale (DES) was developed and psychometrically tested among Caucasians (8,12,13). Two versions exist: the long one (DES-37) (12) has 37 items ($\alpha = 0.94$) with eight subscales and the short one (DES-28) (13) has 28 items ($\alpha = 0.96$) with three subscales. In the past decade, the prevalence of diabetes and, consequently, hospital admissions and mortality rates have risen steadily in Hong Kong (14), spurring diabetologists to advocate the use of empowerment as a model of diabetes care and education (4). It was therefore thought appropriate to develop a version of the DES for a Hong Kong Chinese population. The aim of this study was to translate the DES-37 into Chinese and establish its psychometric properties.

RESEARCH DESIGN AND METHODS

— The study design incorporated qualitative and quantitative components that enabled the psychometric properties of the Chinese measure to be established. This two-stage design followed the procedures of previous work that validated instruments translated for use in different languages and cultures (15–17). The first stage involved the translation of the DES-37 and examination of the newly developed Chinese DES (C-DES) for cultural equivalency and content validity, whereas the second stage established construct validity, criterion validity, internal consistency, and test-retest reliability. Figure 1 depicts the procedures used.

Stage 1

The DES-37 was translated into Chinese by a bilingual translator and then translated back into English (back translation) by another bilingual translator. The translation committee (two researchers, two translators, and one research nurse) checked and agreed on a version of the C-DES-37 that best reflected the linguistic and conceptual matter of the original DES-37.

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Abbreviations: C-DES, Chinese Diabetes Empowerment Scale; DES, Diabetes Empowerment Scale.

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

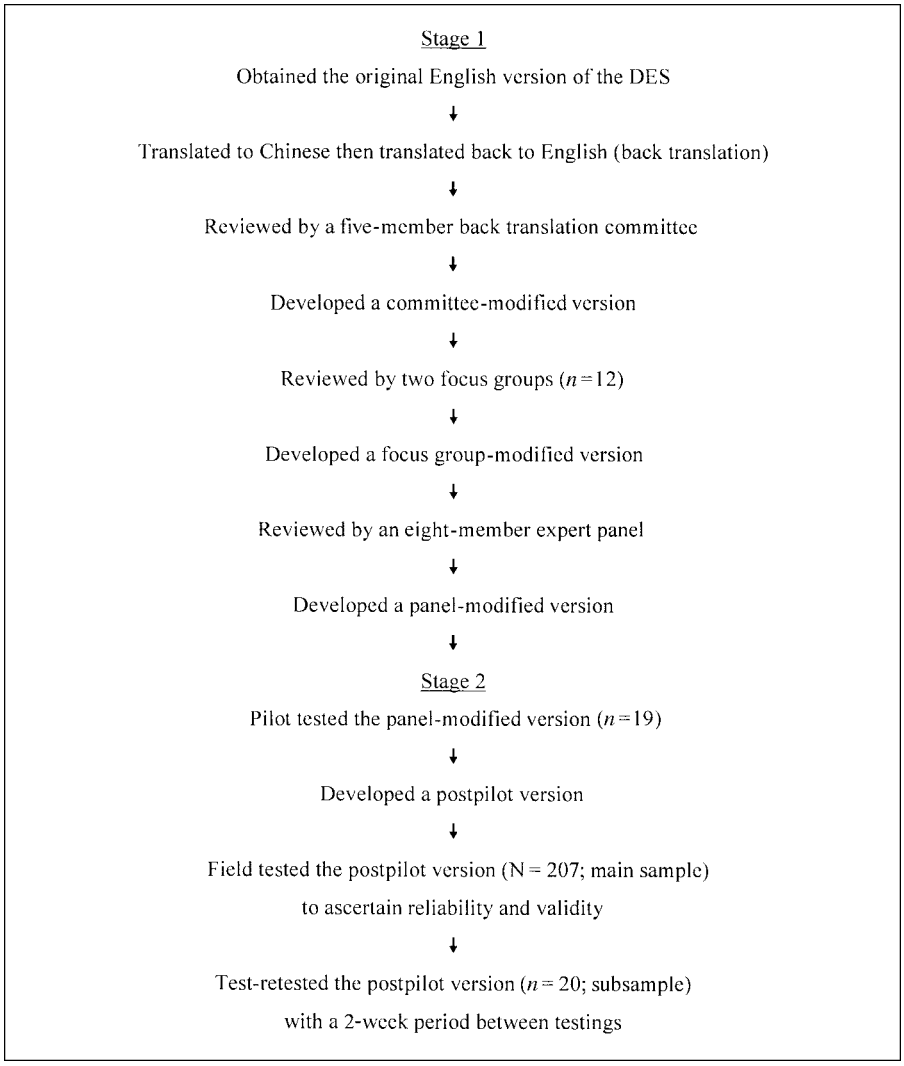

Figure 1—*Flow chart for the development and evaluation of the C-DES.*

Two focus groups (12 council members of two diabetic patient support groups) were invited as experts to give their opinions on the cultural equivalency of the C-DES-37 and the appropriateness of the language used in the items (18). The two focus group interviews, which lasted ~90 and 120 min, respectively, were audiotaped and transcribed verbatim.

Content analysis of the focus group data was done by two researchers and one research nurse. The analysis showed that the groups' suggestions were very similar and that only the wording in some items be changed to reflect the colloquial language used by patients in Hong Kong. There was no indication that items needed to be replaced or eliminated. A focus group–modified C-DES-37 was developed accordingly.

A panel of content experts (four diabetologists and four diabetes nurses with expertise in patient education) judged the content validity of the C-DES-37. These experts were also potential users of the scale. The original DES-37 and the focus group–modified C-DES-37 were sent to each member of the content expert panel, who were bilingual. Content validity was assessed by asking the members to rate each item as a valid measure of the construct using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). A content validity ratio was calculated for each item and for the overall C-DES-37. An acceptable content validity ratio should be >3. The overall ratings were high, attaining a ratio of 4.3 (individual item ratings ranged 4.8–3.9). In addition, the panel was asked to make comments on individual items in relation to the accuracy, clarity, style, and cultural relevance of the translation. Minor changes were suggested (on the fluency of two items), and a panel-modified version was developed.

Stage 2

The panel-modified version of the C-DES-37, together with an additional section on demographic and clinical data, was pilot tested with 19 patients. This was done to check the data collection procedure and the administration of the scale for clarity and patients' willingness to complete it. A research nurse read the scale in Cantonese, a dialect spoken by >95% of Hong Kong citizens, in a consistent manner and recorded the responses.

The patients in the pilot study initially commented on the nonspecificity of the wording in some of the items involving "diabetes goals." Some patients expected that specific goals within the items would be defined for them. However, it was clarified that the scale was aimed at measuring their own ability to achieve goals set by them rather than those defined by others. After this explanation, the patients found it easy to respond to these nonspecific items. They required an average of 15 min to complete the C-DES-37.

To avoid bias in the main study, a standardized statement was read to each respondent before administering the scale. This statement explained that the purpose of the scale was to measure their ability to cope with psychosocial problems arising from diabetes self-management. Diabetes goals for respondents were not defined. However, they were asked to state their level of agreement on their own ability to identify and achieve such goals. The sequence of the items was also altered. Items that patients regarded as comparatively difficult to respond to were moved to the latter half of the scale, whereas those regarded as easy were placed earlier. The purpose of the resequencing was to avoid discouraging the respondents by having them answer easier questions first and difficult ones later. A postpilot version of the scale was developed.

A diabetes specialist clinic provided the setting for the main study. All patients (type 1 or type 2 diabetic) aged ≥18 years who attended the clinic during the 3-month data collection period provided the sampling frame. A sample size of ≥185 patients was required to provide a

Table 1—*Demographic and clinical data*

	Frequency (%)
N	207
Age (years)*	
18–25	3 (1.4)
26–35	15 (7.3)
36–45	40 (19.3)
46–55	60 (29.0)
56–65	55 (26.6)
≥66	34 (16.4)
Sex (male/female)	99/108 (47.8/52.2)
Level of education	
No formal education	32 (15.5)
Primary	66 (31.9)
Secondary	94 (45.4)
Tertiary and postgraduate	15 (7.2)
Type 1/type 2 diabetes	36/171 (17.4/82.6)
Length of time since diagnosed (years)†	
<1	6 (2.9)
1–2	20 (9.7)
3–5	35 (16.9)
6–10	56 (27.0)
11–20	70 (33.8)
>20	20 (9.7)
Metabolic control (HbA_{1c})‡	
Optimal control (<7.0%)	64 (30.9)
Borderline control (7–8.5%)	83 (40.1)
Poor control (>8.5%)	60 (29.0)

Mean ± SD: *52.98 ± 12.44; †10.53 ± 7.55; ‡HbA_{1c} 7.88 ± 1.61%.

minimum of five respondents per item on the C-DES-37 for factor analysis purposes (19–21). Systematic random sampling was used to select every fourth patient from a printed follow-up appointment list. Those with language problems, such as stroke patients who exhibited speech difficulties, were excluded from the study.

Patients were contacted by telephone by a research nurse 1 week ahead of their clinic visit to explain the nature and purpose of the study, assure confidentiality of personal data, and inform them of their right to withdraw from the study at any time without jeopardizing their care. After obtaining verbal consent, the research nurse set up an appointment with each patient for a structured interview on the same day as the follow-up visit. HbA_{1c} results taken on the follow-up visit were retrieved from the patient's record.

Analysis

Descriptive statistics were used to establish the frequency, range, mean, and SD of demographic and clinical characteristics of the main sample. Factor analysis was used to determine the construct validity of the scale. As in the original DES study (13), a principal components factor analysis using varimax rotation was used to identify an empirically derived set of subscales. Factor loadings ≥0.50 were considered significant and were used to define factors. An iterative process of factor and item analyses was used to compare various forced factor solutions to determine the smallest number of factors that were psychologically coherent and meaningful. The identified factors should have the smallest number of items with a coefficient ≥0.70.

Pearson correlation coefficients were performed to examine the relationships among the final C-DES subscales identified from the analysis, and between the final C-DES, the C-DES-37, and the C-DES-28 (the 28 items comprising the short version of the DES were included among the 37 items of the long version, the C-DES-37). A Cronbach's α-coefficient was calculated for each subscale and the overall final C-DES to determine internal consistency.

Test-retest reliability using intraclass correlation coefficients was evaluated with a 2-week interval between tests, with a subsample of 20 patients who participated in the main study. This time period was selected with the expectation that it was short enough that empowerment would be unlikely to change but long enough to minimize the risk of eliciting responses that were recalled from prior testing.

Pearson correlation coefficients between HbA_{1c} and the final C-DES were calculated to establish the criterion validity of the scale. HbA_{1c} was selected as a criterion based on the assumption that people with high empowerment would exhibit better self-management, resulting in better metabolic control (8). Reverse scores were performed for all items of the C-DES so that a high DES score signified high empowerment (1 = strongly disagree, 5 = strongly agree).

RESULTS

Demographic and clinical data

Of the 298 total patients identified from the appointment list, 52 refused to participate, 25 could not be contacted, and 14 did not keep their appointment. Thus, the main sample consisted of 207 patients (response rate = 70%). A goodness-of-fit χ^2 test revealed no statistically significant differences between the respondents and nonrespondents in terms of age and sex.

Table 1 displays the demographic and clinical data of the respondents. The majority were aged between 46 and 65 years (53 ± 12.4 [mean ± SD]). Most (83%) had type 2 diabetes, one-third (30%) had diabetes diagnosed within the past 5 years, and another one-third (31%) had optimal metabolic control according to World Health Organization criteria (22).

Psychometric tests and scale statistics

Factor analysis yielded 11 factors with Eigen values ≥1.0. After an iterative process of factor and item analyses, a five-factor solution was judged the best. This yielded a 20-item C-DES (C-DES-20; α = 0.86) with five subscales accounting for 63.3% of the total variance. Descriptive statistics for the subscales are presented in Table 2, and a list of their items are displayed in Table 3.

The correlations among the five sub-

Table 2—*Descriptive statistics for C-DES-20 subscales*

Subscale name	*n*	Means ± SD (range)	Standardized item α	Variance (%)	Eigen value
1. Overcoming barriers	4	3.33 ± 0.86 (1–5)	0.89	27.2	5.4
2. Determining suitable methods	5	3.81 ± 0.49 (2–5)	0.79	12.5	2.5
3. Achieving goals	4	3.75 ± 0.59 (2–5)	0.78	9.4	1.9
4. Obtaining support	3	3.77 ± 0.60 (1–5)	0.78	7.5	1.5
5. Coping	4	3.58 ± 0.67 (1.75–5)	0.76	6.7	1.3

N = 207. C-DES-20: α = 0.86, 3.65 ± 0.40 (mean ± SD), range 2.3–5.

scales ranged between 0.34 and 0.63. The C-DES-20 test-retest reliability using intraclass correlation coefficients of a subsample of patients ($n = 20$; mean age 51 ± 11.5 years) was 0.75 (95% CI 0.43–0.91). The coefficients among the subscales ranged from 0.73 to 0.83 (95% CI 0.40–0.94).

The correlation of the C-DES-20 with the C-DES-37 and the C-DES-28 is 0.95 and 0.93, respectively. No significant correlation was found among the five subscales, the global scale, and HbA_{1c} in the main sample. When the main sample was categorized into respondents with type 1 ($n = 36$) and type 2 ($n = 171$) diabetes, a significant correlation was found between the global scale and HbA_{1c} of type 2 respondents (−0.17, $P = 0.03$), indicating that the higher the C-DES scores, the lower the HbA_{1c} values. All other correlations were not significant. After controlling for the effects of age, educational level, and length of time since diabetes diagnosis, the correlation between global empowerment and HbA_{1c} of type 2 diabetic respondents remained significant but was not significant for type 1 diabetic respondents.

CONCLUSIONS — The findings of this study provide support for the construct validity and test-retest reliability of the C-DES-20. The α-coefficient for the five subscales and the global C-DES-20 was good. The strength of the intercorrelations among the C-DES-20 subscales suggests that the instrument measures related but separate domains of empowerment (23). The test-retest reliability of the C-DES-20 was supported by the intraclass correlation of the subsample of 20 patients when tested after a period of 2 weeks.

However, criterion validity was not supported by most correlations among the C-DES-20 subscales, global scale, and HbA_{1c}. Only a weak correlation was found between global scale and HbA_{1c} of respondents with type 2 diabetes. The lack of significant correlations may have been caused by the adoption of an undifferentiated sample. The U.K. Prospective Diabetes Study (24) demonstrated that no

Table 3—*Items of the five subscales of C-DES-20*

Subscale name	Items
1. Overcoming barriers	In general, I believe that I
	. . .know which barriers make reaching my diabetes goals more difficult.
	. . .can think of different ways to overcome barriers to my diabetes goals.
	. . .can try out different ways of overcoming barriers to my diabetes goals.
	. . .am able to decide which way of overcoming barriers to my diabetes goals works best for me.
2. Determining suitable methods	. . .know how to get the facts I need to make diabetes care choices that are right for me.
	. . .know enough about diabetes to make self-care choices that are right for me.
	. . .know enough about myself as a person to make diabetes care choices that are right for me.
	. . .know how to learn more about myself as a person to make diabetes care choices that are right for me.
	. . .am able to figure out if it is worth my while to change how I take care of my diabetes.
3. Achieving goals	. . .can choose realistic diabetes goals.
	. . .know which of my diabetes goals are most important to me.
	. . .am able to turn my diabetes goals into a workable plan.
	. . .can reach my diabetes goals once I make up my mind.
4. Obtaining support	. . .know what things support me in caring for my diabetes.
	. . .know where I can get support for having and caring for my diabetes.
	. . .can ask for support for having and caring for my diabetes when I need it.
5. Coping	. . .can cope with feeling down about having diabetes.
	. . .know the ways that having diabetes causes stress in my life.
	. . .know the positive ways I cope with diabetes-related stress.
	. . .can cope well with diabetes-related stress.

matter which treatment regime patients with type 2 diabetes received, the subjects' metabolic control deteriorated over time. In the current study, although the effect of the duration of diabetes was statistically controlled for in the data analysis, this could not circumvent the fact that many type 2 diabetic patients may have had undiagnosed diabetes for a long time prior. It is of interest that a cross-sectional study (25) with American veterans (n = 90) also demonstrated a lack of correlation between metabolic control and DES-37.

Given the limited empirical findings in the measurement of empowerment among Chinese people with diabetes, the C-DES-20 has potential as an outcome measure for patient education and health promotion. Considering its brevity and ease of administration, the C-DES-20 can be used to identify patients who are less capable of dealing with diabetes-specific psychosocial problems and require special attention. Further study with different Chinese populations will be required to confirm the factor structure of the scale.

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