Diabetes-Related Distress and Physical and Psychological Health in Chinese Type 2 Diabetic Patients

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OBJECTIVE—To validate a Chinese version of the Diabetes Distress Scale (CDDS).

RESEARCH DESIGN AND METHODS—The CDDS was derived using forward-backward translation and administered in 189 Chinese type 2 diabetic patients with evaluation of its psychometric properties.

RESULTS—On the basis of principal-component analysis, three factors of the 15-item version of the CDDS (CDDS-15) accounted for 63% of the variance. The correlation coefficient between the original 17-item and 15-item scales was 0.99. The Cronbach α of the CDDS (CDDS-15) accounted for 63% of the variance. The correlation coefficient between the original 17-item and 15-item scales was 0.99. The Cronbach α for internal consistency was 0.90, and the test-retest reliability coefficient was 0.74. The CDDS-15 score was significantly associated with glycemic control, obesity, depressive symptoms, and quality of life.

CONCLUSIONS—The CDDS-15 is a valid and reliable instrument to assess diabetes-related distress.
items (questions 2, 4, and 9) on factor 3 (physician-related distress subscale). There were high correlations between the CDDS-17 and CDDS-15 versions \((r = 0.994, P < 0.001)\).

For internal consistency, the Cronbach \(\alpha\) of the CDDS-15 was 0.902. The respective value for the emotional burden subscale was 0.874, the regimen- and social support–related distress subscale was 0.816, and the physician-related distress subscale was 0.851. The test-retest coefficient for CDDS-15 was 0.739, with similar scores between the first and second assessment (40.4 ± 13.2 versus 40.4 ± 12.8, \(P = 0.971)\).

The CDDS-15 score and its subscales were significantly correlated with glycemic (fasting plasma glucose and HbA1c) and obesity (BMI and waist circumference) indices, depression symptoms (CESD and PHQ-9 scores), and quality of life (EQ-5D). There was no association between CDDS-15 and other parameters, including self-care behaviors and treatment modality (Table 1). For every 1-SD decline (13.2 marks) in CDDS-15 score, the multivariate-adjusted odds ratio for attaining an HbA1c goal of <7% was 0.625 (95% CI 0.439–0.891; \(P = 0.009)\).

**CONCLUSIONS**—This is the first study to evaluate the psychometric properties of the DDS in Chinese type 2 diabetic patients. The CDDS-15 showed consistent factor structure, high internal consistency, good validity, and high test–retest reliability. The factor structure of the CDDS-15 was similar to that of the original DDS-17, despite excluding two double-loaded items (questions 12 and 15) after exploratory factor analysis.

Hong Kong has a heavily subsidized health care system, where public hospital clinics provide care to >90% of patients with chronic diseases such as diabetes (7). Because patients cannot choose their own doctor, question 15 is always a problem in our population. The redundancy of question 12 might be attributed to its similarity with other questions in the regimen- and social support–related distress subscale when translated to Chinese. The new regimen- and social support–related distress subscale combined regimen-related distress and interpersonal distress; furthermore, the CDDS-15 included item 10 in the emotional burden subscale instead of the regimen-related subscale, as in the original English version. This discrepancy might be attributed to cultural differences in perceiving or coping with distress, which might be closely related to social support in our population. Despite these subtle differences, the CDDS-15 had a structure largely similar to the DSS-17 and was able to distinguish and quantify three related domains of diabetes-related distress.

Congruent with the original DDS validation study, the CDDS-15 score was positively associated with depressive symptoms (CESD score). In addition, it was associated with glycemic and obesity indices. Obese subjects often have suboptimal quality of life (8,9), probably because of the long-term struggle to lose or maintain body weight. There are close linkages between mental stress and activation of the stress hormonal systems, notably the hypothalamic-pituitary-adrenal axis, which can set up a vicious cycle of stress and obesity (10). Contrary to findings from other cohorts (1,11,12), the CDDS-15 score was not associated with diabetes complications, self-care, and treatment modality, which might be confounded by small sample size or selection bias. Although many of our patients received diabetes education, this might not necessarily be matched by a subjective assessment of adequacy of self-management and related stress. Thus, apart from ethnicity and clinical profiles, heterogeneity in health care settings and cultures may contribute to subtle differences in the factor structures of the DDS, which will need to be validated in different populations before clinical use.

In summary, we have developed and confirmed the validity, consistency, and reliability of the CDDS-15 in Hong Kong Chinese type 2 diabetic patients.

**Acknowledgments**—No potential conflicts of interest relevant to this article were reported.

R.Z.W.T. researched data, contributed to the discussion, and wrote, reviewed, and edited the manuscript. H.N. researched data, contributed to the discussion, and wrote, reviewed, and

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**Table 1—Correlations between the CDDS-15 scores and items of interest**

|                      | Total score | Emotional burden | Regimen- and social support distress | Physician-related distress |
|----------------------|-------------|------------------|--------------------------------------|---------------------------|
| CDDS-15 score (means ± SD) | 40.6 ± 13.2 | 17.5 ± 6.4       | 17.2 ± 6.1                           | 5.9 ± 3.2                 |
| Age                  | −0.077      | −0.057           | −0.089                               | −0.031                    |
| Sex                  | −0.086      | −0.119           | −0.095                               | 0.064                     |
| BMI                  | 0.147*      | 0.146*           | 0.124                                | 0.077                     |
| Waist circumference  | 0.174*      | 0.207*           | 0.124                                | 0.072                     |
| Fasting plasma glucose | 0.278†      | 0.248†           | 0.261†                               | 0.141                     |
| HbA1c                | 0.183*      | 0.218†           | 0.177†                               | −0.008                    |
| CESD Depression Score | 0.511†      | 0.574†           | 0.362†                               | 0.272†                    |
| PHQ-9 Depression Score | 0.426†      | 0.495†           | 0.288†                               | 0.220†                    |
| Quality of life (EQ-5D) | −0.285†   | −0.301†          | −0.229†                              | −0.141                    |
| Meal planning‡      | 0.019       | 0.051            | −0.077                               | 0.120                     |
| Exercise‡           | −0.013      | −0.041           | −0.180                               | −0.060                    |
| Self-monitoring of blood glucose‡ | −0.046    | −0.020           | −0.076                               | −0.004                    |
| Foot care‡          | 0.060       | 0.090            | 0.000                                | 0.067                     |
| Diabetic retinopathy (yes) | −0.56    | −0.018           | −0.055                               | −0.090                    |
| Coronary heart disease (yes) | −0.88     | 0.052            | −0.099                               | −0.068                    |
| Stroke (yes)        | 0.051       | 0.056            | 0.014                                | 0.073                     |
| Use of insulin (yes) | −0.063      | −0.140           | 0.017                                | −0.011                    |

*P < 0.05. †P < 0.01. ‡Derived from the SDSCA score: number of days following the recommendations in the past 1 week.
Development of the CDDS

edited the manuscript. M.W.M.Y. researched data and wrote the manuscript. A.P.S.K. reviewed and edited the manuscript. R.C.W.M. reviewed and edited the manuscript. R.Y.M.W., K.L., W.-Y.S., C.-C.C., and G.T.C.K. contributed to the discussion and reviewed and edited the manuscript. Y.-K.W. and J.C.N.C. conceptualized the study, contributed to the discussion, and reviewed and edited the manuscript. J.C.N.C. finalized the manuscript.

Parts of this article were presented in poster form at the 8th International Diabetes Federation Western Pacific Region Congress, Busan, Korea, 17–20 October 2010.

The authors thank all medical, nursing, and clerical staff of the Prince of Wales Hospital Diabetes Centre in recruiting and managing these patients. Special thanks are extended to Professor Edwin B. Fisher (University of North Carolina) for his kind advice in preparing the manuscript.

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