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ORIGINAL ARTICLE

Psychometric properties of the Chinese version of the Problem Areas in Diabetes scale (SG-PAID-C) among high-risk polypharmacy patients with uncontrolled type 2 diabetes in Singapore

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ABSTRACT

Aims/Introduction: Undetected diabetes distress is a cause of concern. However, the lack of a validated questionnaire is a barrier to screening for diabetes distress. The aim of the present study was to examine the validity and reliability of the Chinese version of the Problem Areas in Diabetes scale (SG-PAID-C), and its association with sociodemographic and clinical parameters in patients with type 2 diabetes.

Materials and Methods: This cross-sectional study was carried out in four outpatient healthcare institutions in Singapore. Chinese-speaking patients with uncontrolled type 2 diabetes, polypharmacy, and multiple comorbidities were administered the SG-PAID-C and European Quality of Life-5 Dimensions questionnaires as quality of life measures. The factorial construct, convergent validity and internal consistency of SG-PAID-C were evaluated.

Results: The exploratory factor analysis resulted in a three-factor structure of SG-PAID-C with subscales on emotional- and management-related problem (11 items), ability to cope with diabetes problem (3 items) and support-related problem (2 items). The findings also showed good model fit in the confirmatory factor analysis, and provided support for the construct and convergent validity of SG-PAID-C. Overall, the internal consistency of SG-PAID-C was good (Cronbach's alpha = 0.900). Sex and duration of diabetes were positively associated with the 16-item SG-PAID-C, whereas age and type of antidiabetic agents were inversely associated with the 16-item SG-PAID-C.

Conclusions: The 16-item SG-PAID-C is a valid and reliable instrument for use among patients with uncontrolled type 2 diabetes in Singapore. Future studies on its clinical utility should be carried out.

INTRODUCTION

Worldwide, diabetes is forecast to increase from 415 million people in 2015 to 642 million people by 2040[1]. With 60% of the population with diabetes living in Asia, the escalating epidemic of diabetes in the coming decades will bring about a higher disease burden in Asian countries[2]. In Singapore, an island-nation in Asia, the population with diabetes is projected to increase from 8.2% in 2004 to 15% by 2050[3,4]. In this Southeast Asian nation, diabetes is one of the most common chronic diseases and a leading cause of diabetes-related complications, such as kidney failure and blindness[5,6].

Prevention of the complications associated with diabetes requires lifestyle modifications, adherence to medications and monitoring of blood glucose to ensure continuous control of glycemia. However, these self-care efforts required to maintain the recommended range of glucose are not only tiring, but also

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stressful[7,8]. Often times, patients experienced diabetes distress as a result of the challenges of managing their disease[9]. Studies have shown that diabetes distress negatively impacts on the quality of life and blood glucose control of patients with uncontrolled diabetes ($P < 0.001$)[10,11]. Despite these adverse outcomes, the detection rate of diabetes distress in patients with uncontrolled glycemia remained low, as just 28% of patients suffering from severe emotional burden of diabetes were diagnosed in an outpatient diabetes clinic[12].

Therefore, the use of questionnaires might aid in the screening of symptoms related to diabetes distress in patients. Several questionnaires, such as Questionnaire on Stress in Patients with Diabetes-Revised, Diabetes Distress Scale and Problem Areas in Diabetes (PAID) have been utilized to assess diabetes distress[13–15]. Among these different questionnaires, PAID is the most commonly used instrument for identifying patients afflicted with diabetes distress in various research and clinical settings. The PAID instrument also encompasses a wider variety of diabetes-related psychological issues, which include psychological burnout and non-acceptance[16].

The 20-item PAID, originally developed for English-speaking patients in the USA, has since been translated into different languages and used worldwide[15]. Studies on the psychometric properties of the different language versions of PAID have shown different underlying factorial-constructs ranging from one- to four-factor structures[15,17–19]. The literature has also shown that the factor structures of the English version of PAID differ across studies because of the varying cultures in different countries, as well as the diverse medical characteristics of different study populations[15,20]. The Chinese version of PAID (PAID-C) has shown a one-factor structure in Taiwan, but its factor structure among Chinese-speaking Singaporean patients remains unknown. Therefore, we aimed to examine the validity and reliability of SG-PAID-C, and evaluate the association of SG-PAID-C with sociodemographic and clinical parameters in polypharmacy patients with uncontrolled type 2 diabetes in Singapore.

MATERIALS AND METHODS

Study design, settings and procedures

The present cross-sectional study was carried out in four outpatient healthcare institutions in Singapore. Patients were approached at the study sites and screened by the research assistants. Eligible patients included Chinese-speaking patients with uncontrolled type 2 diabetes defined as glycated hemoglobin >7%, with polypharmacy defined as four or more medications, and multiple comorbidities defined as two or more chronic diseases[21,22]. Patients with type 1 diabetes or those who were unable to communicate independently were excluded from the study. After signing the informed consent, a survey on sociodemographics, SG-PAID-C and European Quality of Life-5 Dimensions (EQ-5D) were administered to patients by the research assistants. Clinical parameters were extracted from the electronic database of the healthcare institutions. This study was approved by the institutional review board of the National Healthcare Group and the National University of Singapore.

Study measures

SG-PAID-C

This 20-item PAID-C has a five-point Likert scale from 0 (not a problem) to 4 (serious problem). Summation of the individual score of each of the items would yield a total score. The total score is multiplied by 1.25 to transform into a scale ranging from 0 to 100, with a higher score indicating higher diabetes distress. A study on the psychometric properties of PAID-C carried out in Taiwan has shown the validity and reliability in assessing diabetes distress in Chinese patients with type 2 diabetes[23]. In this present study, the Taiwan PAID-C was adapted to ensure cultural and linguistic appropriateness for use in Singapore. A local native speaker of the Chinese language converted traditional Chinese characters used in the Taiwan PAID-C into equivalent simplified Chinese characters used in Singapore. The accuracy of the adapted SG-PAID-C was confirmed by another local native speaker of the Chinese language.

EQ-5D

The EQ-5D consists of a five-dimension descriptive system and a 20-cm vertical visual analog scale. Each dimension of the descriptive systems assesses one aspect of health outcome: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. For each dimension, patients are asked to choose one of the three levels that describe their current health state: (i) no problems; (ii) some/moderate problems; and (iii) extreme problems. Using the societal value set for EQ-5D health states developed in Singapore, the responses are transformed into an index score, which ranges from −0.769 to a maximum of 1, with 1 representing full health, 0 representing death and negative values representing health states worse than death[24]. The visual analog scale provides a direct self-valuation of current health, which is rated from a graduated scale of 0 (worst imaginable health) to 100 (best imaginable health). In addition, a validation study on the Chinese version of EQ-5D has supported the EQ-5D's known-groups construct validity and test–retest reliability (Cohen's κ ranged from 0.41 to 1.00; $P < 0.001$)[25].

Statistical analysis

All data are presented as mean ± standard deviation for continuous variables and as percentages for categorical variables. Descriptive statistics were utilized to analyze the sociodemographic and clinical parameters. An exploratory factor analysis was carried out to explore the dimensional structure of SG-PAID-C, and varimax rotation was used as it has been utilized in other validation studies on PAID[18,26]. The optimal number of factors was identified from a preliminary principal component analysis using the eigenvalue >1 criterion and the scree

plot inspection for the point of inflexion. In addition, a loading level ≥0.50 was used for the items to be included in the extracted factors. The analysis was followed by a confirmatory factor analysis (CFA) with varimax rotation. The model fit was deemed satisfactory if the following criteria for goodness of fit indices were met: ratio of the χ^2 value to the degrees of freedom <3.00, goodness-of-fit index >0.90, comparative-fit index >0.90, root mean square residual <0.08 and root mean square error of the approximation <0.08.

Convergent validity of SG-PAID-C and its subscales with the anxiety/depression dimension of EQ-5D were examined using Spearman's rank order correlation. The reliability of SG-PAID-C and its subscales were assessed by calculating the Cronbach's alpha for subscales with at least three items, and Spearman's correlation coefficient for subscales with two items. Subscales with Cronbach's alpha ≥0.60 were considered to have acceptable internal consistency[27]. The strength of Spearman's correlation coefficient was categorized as good (0.7–1), moderate (0.5–0.7) and weak (0.3–0.5)[28]. The general linear models were also used to examine the relationship among SG-PAID-C and its subscales with sociodemographic and clinical parameters. A two-tailed *P*-value <0.05 was considered statistically significant. All data analyses were carried out using IBM SPSS Statistics version 23.0 and AMOS version 23.0 (IBM, Armonk, NY, USA).

RESULTS

Of the 944 Chinese-speaking patients approached for participation, 733 patients did not participate because of ineligibility (n = 326) or refusal to participate (n = 407). A total of 211 eligible patients agreed to participate in the study. The mean (±standard deviation) age, glycated hemoglobin, and duration of diabetes were 61.7 ± 7.5 years, 8.5 ± 1.5% and 14.3 ± 9.7 years, respectively. The majority were employed married men with at least an elementary education. The average number of comorbidities was 3.7 ± 1.4, which included dyslipidemia (99.5%, n = 210), hypertension (92.4%, n = 195), kidney disease unrelated to diabetes (37.0%, n = 78) and ischemic heart disease (25.6%, n = 54). The average number of diabetes-related complications was 0.2 ± 0.5. In addition, most patients (70.6%) were prescribed oral antidiabetic agents, and had an average of 6.8 ± 1.6 chronic medications (Table 1).

The average EQ-5D index score and the visual analog scale score were 0.86 ± 0.19 and 69.50 ± 15.39, respectively. In the anxiety/depression dimension of EQ-5D, just 14.7% (n = 31) of patients reported some/moderate or extreme problems. The overall mean (±standard deviation) SG-PAID-C score was 25.35 ± 19.32, with scores ranging from 0 to 73.8. The most common item considered as a serious problem was related to worrying about the future and the possibility of serious complications (45.0%, n = 95). This was followed by items related to feeling deprived of food and meals (29.9%, n = 63), feeling discouraged with diabetes treatment plan (27.5%, n = 58), feeling scared when thinking about living with diabetes (25.1%, n = 53), and feeling constantly concerned about food and eating (22.3%, n = 47).

Table 1 | Study participants' sociodemographic and clinical parameters

	Value
Age (years)	61.7 ± 7.5
Sex	
Female	101 (47.9)
Male	110 (52.1)
Education level	
No formal education	21 (10.0)
Elementary	104 (49.3)
High school	71 (33.6)
College/university	15 (7.1)
Marital status	
Single	15 (7.1)
Married	163 (77.3)
Divorced/separated/widowed	33 (15.6)
Work status	
Employed	104 (49.3)
Retired	51 (24.2)
Homemaker	46 (21.8)
Others	10 (4.7)
Total no. comorbidities†	3.7 ± 1.4
Total no. diabetes-related complications	0.2 ± 0.5
Duration of diabetes (years)	14.3 ± 9.7
Most recent HbA1c (%)‡	8.5 ± 1.5
Total no. chronic medications	6.8 ± 1.6
Types of antidiabetic medication	
Oral hypoglycemic agents	149 (70.6)
Insulin-containing regimens	62 (29.4)

Data are presented as mean ± standard deviation or whole numbers (percentages) as appropriate. †Comorbidities are defined as chronic conditions other than diabetes that are classified in the 10th revision of the International Classification of Diseases. ‡Most recent glycated hemoglobin (HbA1c) is defined as HbA1c reading taken within 3 months before recruitment into the study.

Construct validity

In the preliminary analysis, the Bartlett test of sphericity was 1735.305 (degrees of freedom = 190, $P < 0.0001$), indicating that the correlations between items were sufficiently large for carrying out the factor analysis. In addition, the Kaiser–Meyer–Olkin value was 0.910, showing that the sample size was adequate for carrying out the factor analysis. Based on the eigenvalue >1 criterion and scree plot inspection, a three-factor solution was examined. Factors 1, 2, and 3 had an eigenvalue of 7.801, 1.354 and 1.128, respectively. In addition, these three factors explained a total of 51.4% of the variance in the model (factor 1 = 39.0%, factor 2 = 6.8% and factor 3 = 5.6%).

Factor 1 consisted of 11 items with loadings from 0.541 to 0.735. The item 'feeling angry when you think about living with diabetes' was loaded on two factors, but it was incorporated into factor 1, as conceptually it was more closely related to the

Table 2 | Factor loadings for the three extracted factors after varimax rotation with Kaiser normalization

	Factor 1	Factor 2	Factor 3
Emotional- and management-related problem			
Not having clear and concrete goals for your diabetes care	0.636	0.114	0.188
Feeling discouraged with your diabetes treatment plan	0.541	−0.033	0.208
Feeling scared when you think about living with diabetes	0.675	0.241	0.085
Feelings of deprivation regarding food and meals	0.665	0.228	−0.044
Feeling depressed when you think about living with diabetes	0.659	0.450	0.094
Not knowing if your mood or feelings are related to your diabetes	0.557	0.363	0.195
Feeling angry when you think about living with diabetes	0.584	0.556	0.114
Feeling constantly concerned about food and eating	0.735	0.132	0.270
Worrying about the future and the possibility of serious complications	0.734	0.137	0.209
Feelings of guilt or anxiety when you get off track with your diabetes management	0.556	0.373	0.241
Feeling that diabetes is taking up too much of your mental and physical energy every day	0.560	0.348	0.216
Inability to cope with diabetes			
Feeling overwhelmed by your diabetes	0.380	0.563	0.206
Not 'accepting' your diabetes	0.160	0.753	0.078
Coping with complications of diabetes	0.136	0.699	0.077
Support-related problems			
Feeling alone with your diabetes	0.166	−0.026	0.769
Feeling that your friends and family are not supportive of your diabetes management efforts	−0.093	0.461	0.585

emotional aspect of diabetes. Factor 2 had three items related to the inability of coping with diabetes with loadings from 0.563 to 0.753. Finally, factor 3 was comprised of two items on support-related problems with loadings from 0.585 to 0.769 (Table 2).

Four items ('uncomfortable social situations related to your diabetes care [e.g., people telling you what to eat],' 'worrying about low blood sugar reactions,' 'feeling unsatisfied with your diabetes physician' and 'feeling "burned out" by the constant effort needed to manage diabetes') were removed from the SG-PAID-C due to loadings of <0.5. By carrying out CFA on the 16-item SG-PAID-C, the three-factor solution yielded three goodness-of-fit criteria that satisfied the cut-off value (ratio of the χ^2 value to the degrees of freedom 2.272, comparative-fit index 0.901 and root mean square error of the approximation 0.078). The other two goodness-of-fit criteria were only slightly outside the cut-off values (goodness-of-fit index 0.884 and root mean square residual 0.084). Overall, the CFA for the three-factor structure of 16-item SG-PAID-C showed a satisfactory fit for the model.

Convergent validity

The 16-item SG-PAID-C score was positively correlated with the anxiety/depression dimension of the EQ-5D ($r_s = 0.306$, $P < 0.01$). Factors 1–3 were also positively correlated with the anxiety/depression dimension of the EQ-5D (factor 1: $r_s = 0.288$, $P < 0.01$; factor 2: $r_s = 0.309$, $P < 0.01$; factor 3: $r_s = 0.281$, $P < 0.01$).

Reliability

Overall, the Cronbach's alpha for 16-item SG-PAID-C score was 0.900, and the alpha values for factors 1 and 2 were 0.897 and 0.650, respectively. The Spearman's correlation coefficient between the two items in factor 3 showed a moderate correlation ($r_s = 0.504$, $P < 0.01$). The corrected item-total correlation was good, as all items received correlations of 0.30 and above. In addition, each value of Cronbach's alpha if the item was deleted was not greater than the overall Cronbach's alpha (Table 3).

Association with sociodemographic and clinical parameters

Female sex was positively associated with the 16-item SG-PAID-C scores and factor 1, whereas duration of diabetes was positively associated with the 16-item SG-PAID-C scores and factor 2. Age was inversely associated with the 16-item SG-PAID-C scores and factors 1 and 2, whereas the type of antidiabetic medication was inversely associated with factor 2 only (Table 4).

DISCUSSION

Our preliminary evaluation of the psychometric properties of 20-item PAID-C using exploratory factor analysis showed a three-factor structure of SG-PAID-C, which incorporated just 16 items. A reduction in the number of items in PAID was also observed in another validation study in Singapore[20]. Our subsequent CFA supported the construct validity of SG-PAID-C with a three-factor solution, as the goodness-to-fit criteria for most of the indices were satisfied. The validation of PAID carried out in Sweden and Greece also showed a three-factor solution[18,29]. However, the present findings were not congruent with the one-factor structure of PAID-c in Taiwan[23]. Compared with the Taiwanese study, our patient population was not only more distressed (PAID-C: 10.95 ± 13.06, SG-

Table 3 | Item statistics for factors 1–3

	Median	95% CI	Frequency response option 3–4 (%)	Corrected item-total correlation	Cronbach's alpha if item deleted
Factor 1: Emotional- and management-related problem (α = 0.897)					
Not having clear and concrete goals for your diabetes care	1	0.94–1.30	18.5	0.562	0.895
Feeling discouraged with your diabetes treatment plan	1	1.37–1.76	27.5	0.420	0.900
Feeling scared when you think about living with diabetes	1	1.11–1.52	25.1	0.639	0.892
Feelings of deprivation regarding food and meals	1	1.49–1.87	29.8	0.568	0.895
Feeling depressed when you think about living with diabetes	0	0.85–1.21	17.6	0.729	0.889
Not knowing if your mood or feelings are related to your diabetes	0	0.80–1.13	14.7	0.623	0.893
Feeling angry when you think about living with diabetes	0	0.68–1.03	14.7	0.739	0.888
Feeling constantly concerned about food and eating	1	1.18–1.54	22.3	0.681	0.890
Worrying about the future and the possibility of serious complications	2	1.91–2.35	45.0	0.670	0.891
Feelings of guilt or anxiety when you get off track with your diabetes management	1	0.99–1.34	17.5	0.663	0.891
Feeling that diabetes is taking up too much of your mental and physical energy every day	1	0.88–1.22	15.6	0.620	0.893
Factor 2: Inability to cope with diabetes (α = 0.650)					
Feeling overwhelmed by your diabetes	0	0.49–0.80	8.5	0.593	0.894
Not 'accepting' your diabetes	0	0.36–0.64	6.2	0.488	0.897
Coping with complications of diabetes	0	0.62–0.97	13.3	0.415	0.900
Factor 3: Support-related problems					
Feeling alone with your diabetes	0	0.28–0.51	4.7	0.329	0.901
Feeling that your friends and family are not supportive of your diabetes management efforts	0	0.16–0.35	2.8	0.313	0.901

PAID-C: 25.35 ± 19.32), but also had longer duration of diabetes (PAID-C: 8.1 ± 7.6 years, SG-PAID-C: 14.3 ± 9.7 years)[23]. Apart from these clinical differences, heterogeneity in the healthcare settings and cultures between Taiwan and Singapore might have contributed to the differences in the factor structure of PAID. In addition, the present study showed that the convergent validity of SG-PAID-C was supported by the moderate correlation of the 16-item SG-PAID-C and its subscales with the anxiety/depression dimension of EQ-5D.

Besides the correlation in the subscale on support-related problem, high Cronbach's alpha was observed for the overall 16-item SG-PAID-C as well as in the subscales on emotional- and management-related problem and inability to cope with diabetes. This finding was comparable with the internal consistency of a similar study with three subscales of PAID (α = 0.61–0.94)[18]. The Cronbach's alpha in the present study also showed that the items in the instrument were not redundant, and the survey length was acceptable[30].

In the present study, diabetes distress was associated with several sociodemographic parameters. Being female was linked to a significantly higher level of diabetes distress. A study showed that women had higher odds of suffering from distress as a result of diabetes (odds ratio 3.74, 95% confidence interval 1.77–7.90, $P < 0.01$)[31]. Longer duration of diabetes was also linked to a significantly higher level of stress. This finding is not surprising, because living with diabetes can result in feelings of being drained, frustrated and discouraged due to the confusing self-care directives over time[14]. An inverse relationship among age and oral hypoglycemic agents with diabetes distress was observed. Patients with increasing age experienced less diabetes distress, as older patients might have less stress over career and household matters in comparison with younger patients[32,33]. Patients taking oral

Table 4 | Multivariate analyses of sociodemographic and clinical parameters

	16-item SG-PAID-C B (95% CI)	Factor 1 B (95% CI)	Factor 2 B (95% CI)	Factor 3 B (95% CI)
Age	−0.460 (−0.805, −0.114)*	−0.377 (−0.661, −0.094)*	−0.081 (−0.154, −0.009)*	−0.001 (−0.036, 0.034)
Sex				
Female	8.267 (3.072, 13.462)*	6.868 (2.606, 11.131)*	1.120 (0.030, 2.211)	0.278 (−0.251, 0.807)
Male				
Education level				
No formal education	−3.646 (−14.572, 7.280)	−3.643 (−12.608, 5.323)	−0.362 (−2.654, 1.931)	0.358 (−0.755, 1.471)
Elementary	1.653 (−6.840, 10.147)	0.995 (−5.974, 7.965)	0.342 (−1.441, 2.124)	0.316 (−0.549, 1.181)
High school	2.219 (−6.554, 10.991)	1.677 (−5.522, 8.875)	0.349 (−1.492, 2.190)	0.193 (−0.700, 1.087)
College/university				
Marital status				
Single	2.690 (−7.193, 12.573)	2.534 (−5.576, 10.643)	−0.446 (−2.520, 1.627)	0.603 (−0.404, 1.609)
Married	2.354 (−3.821, 8.529)	3.369 (−1.698, 8.436)	−0.916 (−2.212, 0.380)	−0.099 (−0.728, 0.530)
Divorced/separated/widowed				
Work status				
Employed	4.767 (−5.422, 14.957)	3.715 (−4.647, 12.076)	1.727 (−0.411, 3.866)	−0.675 (−1.713, 0.363)
Retired	4.583 (−6.174, 15.341)	3.899 (−4.928, 12.726)	1.661 (−0.596, 3.919)	−0.977 (−2.073, 0.118)
Homemaker	−0.907 (−12.204, 10.390)	−0.564 (−9.833, 8.706)	0.985 (−1.386, 3.356)	−1.328 (−2.479, −0.178)
Others				
Total no. comorbidities	−0.452 (−2.171, 1.267)	−0.573 (−1.983, 0.838)	0.029 (−0.332, 0.390)	0.092 (−0.083, 0.267)
Total no. diabetes-related complications	1.538 (−3.469, 6.546)	0.797 (−3.312, 4.906)	0.564 (−0.487, 1.614)	0.178 (−0.332, 0.688)
Duration of diabetes (years)	0.323 (0.075, 0.570)*	0.244 (0.041, 0.448)	0.053 (0.002, 0.105)*	0.025 (0.000, 0.050)
Most recent HbA1c (%)	−0.122 (−1.661, 1.418)	−0.138 (−1.402, 1.125)	−0.050 (−0.373, 0.273)	0.067 (−0.090, 0.224)
Total no. chronic medications	−0.889 (−2.317, 0.538)	−0.710 (−1.881, 0.461)	−0.082 (−0.381, 0.218)	−0.098 (−0.243, 0.048)
Types of antidiabetic medication				
Oral hypoglycemic agents	−3.618 (−8.774, 1.538)	−2.342 (−6.573, 1.889)	−1.363 (−2.445, −0.281)*	0.087 (−0.438, 0.612)
Insulin-containing regimens				

**P*-values were <0.05 for univariate and multivariate analyses. HbA1c, glycated hemoglobin; SG-PAID-C, Chinese version of the Problem Areas in Diabetes scale.

hypoglycemic agents also experienced less distress; in particular, the ability of coping with diabetes, because unlike insulin, oral medication can be easily stored and carried around, and does not require the use of a needle for administration[34]. Consistent with other studies, the correlation between diabetes distress and glycemic control was insignificant in the present study[17,35,36].

The strengths of the present study included complete patient responses, as missing data can result in biased estimates of parameters, loss of information and reduced statistical power[37]. We also examined a distinct group of uncontrolled type 2 diabetic patients with multiple comorbidities and taking multiple chronic medications. The present study had several limitations. First, the findings of this study might not be generalizable to patients with type 1 diabetes, as our study involved only patients with uncontrolled type 2 diabetes. However, the results of this study are pertinent, as an estimated 90% of patients suffer from type 2 diabetes, with the majority of them having uncontrolled glycemia[38,39]. Second, the possibility of sampling bias might occur, as more than half of the patients approached for recruitment declined participation. Therefore, those who joined the study might be more motivated than the non-participants. Third, the responsiveness of the instrument in detecting change was not evaluated. As the validation of the instrument is an ongoing process, future research should examine the responsiveness of the SG-PAID-C using a longitudinal study design.

In conclusion, the 16-item SG-PAID-C is a valid and reliable instrument for use in Singapore. The present study showed that 16-item SG-PAID-C can aid screening for diabetes distress among Singaporean patients with uncontrolled type 2 diabetes. The clinical utility of a shortened 16-item SG-PAID-C should be further evaluated in clinical trials on patients with diabetes.

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DISCLOSURE

The authors declare no conflict of interest.

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