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# Validation of the Filipino Version of the Diabetes Distress Scale for Adult Patients with Diabetes seen at the Outpatient Department of a Tertiary Government Hospital in Quezon City, Philippines

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**Abstract**

Introduction. Caring for persons with diabetes involves a holistic approach. Addressing diabetes distress is crucial to achieve optimal health outcomes for persons with diabetes. This study aims to validate a Filipino version of the diabetes distress scale (DDS).

Methodology. We conducted forward and backward translations to construct a Filipino version from the validated English questionnaire. We performed statistical analysis to check internal consistency and validation and to correlate diabetes distress with glycemic control based on the subjects' HbA1c levels.

Results. We included one hundred and seventy patients (170) seen at the Outpatient Diabetes Clinic in the analysis. Of the participants, 13 (7.6%) have Type 1 Diabetes Mellitus (T1DM), while the rest have Type 2 (T2DM). We found physician distress (PD) to be significantly associated with having T1DM. All domains in the Filipino DDS showed good internal consistency, ranging from 0.81 to 0.85. We used factor analysis to extract four factors similar to the original diabetes distress scale. We did not find any significant correlation between diabetes distress and HbA1c level.

Conclusion. The Filipino DDS showed good internal reliability and had consistent results similar to the original diabetes distress scale. However, we did not find a significant correlation between diabetes-related distress and the HbA1c level.

*Key words: emotional distress, Filipino, diabetes self-management questionnaire, validation*

## INTRODUCTION

Diabetes Mellitus poses a heavy burden worldwide, affecting a significant number of people. As of 2021, the Federation (IDF) reports that 66 million adults worldwide have diabetes, with a local prevalence of 7.5%, or 4.3 million adults.[1] Consequently, deaths due to diabetes mellitus have increased, making it the fifth leading cause of death in 2024.[2] In the Philippines, there is a greater prevalence of diabetes in urban compared to rural areas.[3]

Among Filipino patients, a study done by Bernabe-Dela Victoria and Dampil showed the prevalence of depression to be higher among patients with T2DM, at 19.9%.[4] However, it is important to note that diabetes distress does not equate to clinical depression.[5] Diabetes distress results from the emotional burden in the management of diabetes.[6] However, depression is a risk factor for diabetes and is associated with poor glycemic control and a higher rate of microvascular complications.[6,7] Among patients with T1DM, those with poor glycemic control and higher HbA1c levels have higher diabetes distress scores.[6,8] Lee et al., found that there is a positive correlation between depressive symptoms and heightened diabetes awareness but with further inadequacy in glycemic control.[9] In a local cross-sectional study by Totesora et al., which utilized the Problem Areas In Diabetes (PAID-20) and Diabetes Self-management Questionnaire (DSMQ) to screen for diabetes-related emotional distress and diabetes-reported self-care, respectively, the authors found that majority of patients who reported emotional distress had higher HbA1c levels. Moreover, those with poor self-care were likely to have poor glycemic outcomes.[10]

It is important to consider not only the physical but also the psychological well-being of individuals affected by diabetes. It is crucial to provide comprehensive psycho-social care to identify interpersonal and intrapersonal barriers to diabetes-related health and develop effective intervention strategies.

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Furthermore, since diabetes management relies heavily on the patient's adherence to a treatment regimen, factors affecting self-care, such as diabetes distress, must be identified, addressed, and monitored. As such, the American Diabetes Association suggests including psychological assessment of patients, periodic assessment, and standardized or validated tools to gauge psychosocial wellness.[11]

The most commonly used validated tools to assess diabetes distress are Problem Areas in Diabetes (PAID) and Diabetes Distress Scale (DDS). PAID focuses more on the emotional concerns that can affect health-related quality of life.[12] On the other hand, the DDS evaluates emotional distress related to clinicians, treatment, and personal factors impacting glycemic control, such as behavior and motivation. Developed by William Polonsky, the DDS is applicable for patients with both T1DM and T2DM, provided that these patients do not have severe cognitive impairment.[13] The original DDS comprises 17 questions grouped into four domains as follows: interpersonal distress (ID), emotional burden (EB), regimen-related distress (RR), and physician-related distress (PD). Participants are asked to rate the items listed using a 6-point Likert scale based on their experiences regarding diabetes over the past month. They can indicate whether each item was "not a problem" or if it was considered "a very serious problem."[13] We used DDS in this study as Schmitt et al., found that the psychometric results of the DDS are more precise and more cross-culturally replicable.[14]

In a study by Farm et al., where the authors translated and validated a Bahasa-Indonesian diabetes distress scale, they found that the translated tool provided the necessary factor structure and internal consistency to assess distress among outpatients with T2DM.[15] Similarly, Batais et al., evaluated an Arabic version of the DDS. The results were similar: the Arabic version proved reliable for assessing diabetes distress among outpatients with T2DM.[16] Chew et al., conducted a similar study that found a significant correlation between the score categories of the Malay Diabetes Distress Scale and HbA1c levels among patients with T2DM in the Malay population.[17]

Providing holistic care for patients with diabetes includes identifying areas requiring psychosocial intervention; hence, we aimed to pinpoint those specific areas for our adult diabetic patients seen in the outpatient department. Understanding differences in the patterns of diabetes distress between patients with T1DM and T2DM can help identify which specific psychosocial areas we need to address to aid these patients. As there was a lack of existing literature comparing diabetes distress using the original DDS among adult Filipinos with T1DM and T2DM, this study aimed to fill that knowledge gap. Additionally, even though the Philippines ranks 2nd among Asian countries in the English proficiency index, the ranking did not account for participants without access to the internet since the proficiency index test is administered online.[18] Tagalog or Filipino remains the most widely spoken language,[19] and developing a Filipino version of the Diabetes Distress Scale could help physicians better assess and communicate with patients.

## OBJECTIVES

### General objective

To determine the validity of the translated, revised DDS tool among Filipino patients with diabetes.

### Specific objectives

- To describe the sociodemographic and clinical characteristics of the population
  - Characteristics of interest include age, sex, body mass index, marital status, educational attainment, employment status, duration of diabetes, smoking history, intake of alcohol-containing beverages, HbA1c, antidiabetic medication, and presence of complications such as retinopathy, neuropathy, and nephropathy.
- To determine the correlation of diabetes distress as measured by the DDS tool with glycemic control among adult Filipinos with diabetes.

## METHODOLOGY

### Study design

This study was conducted in two phases. The first phase involved translating and initially validating the Filipino Version of the Diabetes Distress Scale. The second phase involved collecting data to validate the finalized questionnaire and to assess the correlation between diabetes distress and poor glycemic outcomes.

#### *Translation and validation*

The translation process consisted of a forward and backward translation per the recommended guidelines.[20] With permission from the original author, the validated English tool was translated into a Filipino version by two bilingual translators recommended by the Center of the Filipino Language. The forward translations were then reviewed by the researchers and merged into a single document, then translated back to English (back translation) by two bilingual translators. These back translators were professional bilingual (English and Filipino) teachers at a university. Afterward, we compared the back translations to the original DDS. We used the final questionnaire as the initial DDS in Filipino.

The initial DDS was then assessed for content validity by eight respondents (four endocrinologists, two psychiatrists, a family medicine physician, and a nurse practitioner) based on the COSMIN criteria for content validity.[21] From these respondents, we gathered feedback on whether the questions were relevant, comprehensive, and easily under-

stood by the target population. We asked the following questions from the respondents:

**COSMIN criteria for content validity[21]**

| Item | Question |
|---|---|
| **Relevance** | |
| *1* | Are the items relevant to the construct of interest (Diabetes Distress Scale)? |
| *2* | Are the items relevant to the target population of interest (patients with diabetes)? |
| *3* | Are the items relevant for the context of use of interest (To develop a Filipino version of the diabetes distress scale)? |
| *4* | Are the response options appropriate? |
| *5* | Are there other issues that need to be addressed? |
| **Comprehensiveness** | |
| *6* | Are there any missing key concepts for this research paper? |
| **Comprehensibility** | |
| *7* | Are the instructions clear and understandable? |
| *8* | Are the questions clear and understood as intended? |
| *9* | Are the items appropriately worded (i.e., neutral and non-offensive)? |
| *10* | Do the response options match the questions? |

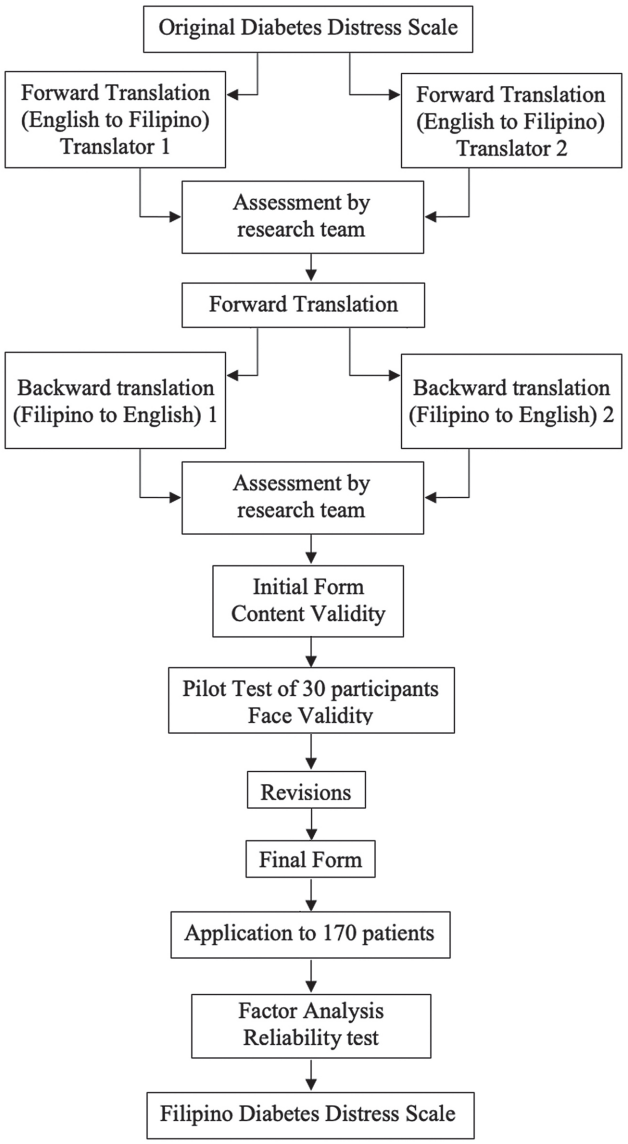


**Figure 1.** Flow diagram of study procedure.

We computed the item-level content validity index (I-CVI), the proportion of experts who agree that the item is either quite or highly relevant. The accepted I-CVI should be greater than 0.8. The investigators and the expert panel reviewed and discussed items with scores lower than 0.8.

After content validity and final revisions, we pilot-tested the Filipino DDS among 30 participants by convenience random sampling at the OPD. For face validity, we gathered feedback from the pilot testing on whether the subjects thought the specific item was essential and if the item was understandable or needed to be rephrased. We also asked the participants whether they had any difficulty answering each question and if there were statements that needed to be rephrased.[21,22] We administered the final questionnaire to 170 participants who have diabetes, either Type 1 or Type 2.

## Study subjects

The participants were patients with diabetes being seen at the Outpatient Department of the East Avenue Medical Center. We employed convenience sampling to select the participants.

### *Inclusion criteria*

- Patients diagnosed with diabetes based on American Diabetes Association (ADA) criteria ≥19 years of age.
  - ADA criteria for diabetes: fasting blood sugar ≥126 mg/dl (7.0 mmol/L), 2-hour plasma glucose level ≥200 mg/dL (11.1 mmol/L) during a 75 g oral glucose tolerance test, or HbA1c ≥6.5%;
- Patients diagnosed with T1DM from childhood who have transferred to the adult endocrinology clinic or diagnosed in the adult endocrinology clinic by having a positive anti-GAD test or with C-peptide levels less than the laboratory-specific normal value.
- Patients already taking antidiabetic medications.
- Patients who gave informed consent.
- Patients who can understand, read, and write in the Filipino language.

### *Exclusion criteria*

- Patients with neurological or psychological impairment or on antipsychotic medications or mood stabilizers.
- Patients with gestational diabetes mellitus.

## Procedure

The researchers collected data by asking patients to answer the questionnaire during their actual visit to the outpatient department. After obtaining the participant's informed consent, the researchers provided the questionnaire for the participant to fill out independently to minimize attention and interviewer bias. On average, participants spent 13 minutes completing the questionnaire (minimum of 8 minutes, maximum of 20 minutes).

### Sample size

According to Krabbe, a validation study should ideally have a minimum sample size of 10 participants for each item in the questionnaire under evaluation. The Diabetes Distress Scale has 17 items; hence, the minimum required sample size is 170. Excluding the initial 30 participants recruited for pilot testing, we enrolled 170 eligible patients who met the inclusion and exclusion criteria.

### Description of outcome measures

#### *Primary outcome measure*

- Content validity – Feedback was gathered from experts as to whether the question is relevant, comprehensive, and easily understood by the target population. Item-level content validity index (I-CVI) was computed wherein the proportion of experts who agree that the item is either quite or highly relevant should outweigh the total number of experts that the accepted I-CVI should be greater than 0.8. An item with a lower score will be subject to review and discussion by the investigators and the expert panel.
- Face validity – Feedback was gathered from the pilot testing as to whether they
- think the specific item is important and if the item is understandable or needed to be rephrased.
- Construct analysis – measured using factor analysis which will be used to verify the scale construction.
- Internal Consistency – the diabetes distress scale measures 4 subsets related to distress with several questions per set. Cronbach alpha is a measure of internal consistency to assess how the questions are interrelated to assess the general distress of interest.

#### *Secondary outcome measure*

- Correlation of glycemic control with diabetes distress scale

### Ethical considerations

The institutional ethical research board approved this study. We secured patient confidentiality by using a participant code to withhold patient identifiers.

### Data analysis

We used descriptive statistics to summarize the general and clinical characteristics of the participants. We used frequency and proportion for categorical variables (nominal/ordinal), mean and standard deviation for normally distributed interval/ratio variables, and median and range for non-normally distributed interval/ratio variables. We used independent T-test, Mann-Whitney U test, and Fisher's Exact/Chi-square test to determine differences in mean, median, and frequency between groups, respectively.

We used Spearman's rank correlation to determine the correlation between HbA1c and distress scores. We performed factor analysis to assess the consistency of the questions concerning construct validity when translated into Filipino. We used Cronbach $\alpha$ to measure internal reliability.

We included all valid data in the analysis. We did not replace or estimate missing variables. We rejected the null hypothesis if the $\alpha$-level of significance was less than 0.05. We used R 4.2.2 (Free Software Foundation, Inc., Boston, MA, USA) for data analysis.

## RESULTS

### Phase I: Questionnaire Formulation

Based on the feedback from the eight respondents, the results of the content validity assessment of the Filipino Diabetes Distress Scale indicated that the items were highly rated as relevant (Appendix Table 1). We received no comments concerning the comprehensiveness of the scale. However, one participant did mention that a word in the translation might not be commonly used. Nonetheless, the initial participants in the pilot testing did not encounter any issues with the original prototype, so it was used for the study.

During the pilot testing, we performed an initial internal reliability test to assess the consistency of the results with the translated questions. A measure of 0.7 – 0.8 was deemed acceptable, with results within 0.8-0.9 deemed good. The initial results for the first 30 participants fell between 0.78 and 0.85, the lowest being interpersonal distress and the highest regimen distress (Appendix Table 2). Aside from this, we conducted face validity to collect feedback on the scale and the questions. All items were perceived as important and understandable (Appendix Table 3).

### Phase II: Validation

No additional modifications were made to the initial DDS since there were no further comments from the participants. One hundred seventy (170) diabetic patients were analyzed for this study: 13 patients had T1DM, and the rest had T2DM (Table 1). The mean age was 53.64 (+ 12.18) years old, with the T2DM group significantly older (55.72 ±_9.91 vs 28.46 ± 8.32, $p$ <0.001). The majority were males (58.82% vs. 41.81%) and overweight (60%), with the median BMI values significantly higher among patients with T2DM (24.07, IQR 21.64-26.72 vs 20.67 IQR 19.61-23.22; $p$ = 0.012). Notably, underweight patients were more frequently seen among patients with T1DM (23.08% vs 6.37%, $p$ = 0.026). Most patients (61.76%) were married, which was more frequently noted in patients with T2DM (64.33% vs 30.77%, $p$ = 0.003). Most patients were high school graduates (58.82%) and unemployed (61.76%). The median duration of diabetes was six years (IQR 3-10 years). Patients with T1DM had a longer median diabetes duration than those with T2DM (10 years, IQR 8-14 years vs six years, IQR 3-10 years). Thirteen (7.65%) patients were smokers, while 18 (10.59%) were alcoholic beverage drinkers. The median HbA1c levels of

**Table 1.** Clinical characteristics of the study population (n=170)

| | Total (n=170) | T1DM (n=13) | T2DM (n=157) | *p*-value |
|---|---|---|---|---|
| ***Age in years (mean ± SD)*** | 53.64 ± 12.18 | 28.46 ± 8.32 | 55.72 ± 9.91 | <0.001* |
| ***Gender n (%)*** | | | | 0.931† |
| Male | 70 (41.81) | 6 (46.15) | 64 (40.76) | |
| Female | 100 (58.82) | 7 (53.85) | 93 (59.24) | |
| ***BMI Median (IQR)*** | 23.88 (21.31-26.68) | 20.67 (19.61-23.22) | 24.07 (21.64-26.72) | 0 |
| Underweight n (%) | 13 (7.65) | 3 (23.08) | 10 (6.37) | 0.026‡ |
| Normal n (%) | 55 (32.35) | 6 (46.15) | 49 (31.21) | |
| Overweight n (%) | 102 (60) | 4 (30.77) | 98 (62.42) | |
| ***Civil status n (%)*** | | | | 0.003‡ |
| Single | 39 (22.94) | 9 (69.23) | 30 (19.11) | |
| Married | 105 (61.76) | 4 (30.77) | 101 (64.33) | |
| Separated | 5 (2.94) | 0 | 5 (3.18) | |
| Widowed | 21 (12.35) | 0 | 21 (13.38) | |
| ***Educational attainment n (%)*** | | | | 0.686‡ |
| Elementary | 22 (12.94) | 1 (7.69) | 21 (13.38) | |
| High school | 100 (58.82) | 7 (53.85) | 93 (59.24) | |
| College | 38 (22.35) | 4 (30.77) | 34 (21.66) | |
| Vocational | 10 (5.88) | 1 (7.69) | 9 (5.73) | |
| ***Employment status n (%)*** | | | | 0.068‡ |
| Unemployed | 105 (61.76) | 12 (92.31) | 93 (59.24) | |
| Employed | 33 (19.41) | 1 (7.69) | 32 (20.38) | |
| Retired | 32 (18.82) | 0 | 32 (20.38) | |
| ***Duration of diabetes, years*** median (IQR) | 6 (3-10) | 10 (8-14) | 6 (3-10) | 0.005§ |
| Smoking n (%) | 13 (7.65) | 1 (7.69) | 12 (7.64) | >0.999‡ |
| ***Alcoholic beverage drinker, n (%)*** | 18 (10.59) | 1 (7.69) | 17 (10.83) | >0.999‡ |
| ***HbA1c % median (IQR)*** | 8.3 (6.61-10.2) | 9.6 (9-11.2) | 8.2 (6.6-10.07) | 0.015§ |
| ***Antidiabetic medication, n (%)*** | | | | |
| Oral | 146 (85.88) | 0 | 146 (92.99) | <0.001‡ |
| Insulin | 91 (53.53) | 13 (100) | 78 (49.68) | <0.001‡ |
| Others | 1 (0.59) | 0 | 1 (0.64) | >0.999‡ |
| ***Complications n (%)*** | | | | |
| Retinopathy | 113 (66.47) | 11 (84.62) | 102 (64.97) | 0.223‡ |
| Neuropathy | 105 (61.76) | 7 (53.85) | 98 (62.42) | 0.564‡ |
| Nephropathy | 38 (22.35) | 3 (23.08) | 35 (22.29) | >0.999‡ |
| ***DDS score (total scale) Median (IQR)*** | 1.706 (1.191-2.632) | 2.176 (1.529-2.941) | 1.647 (1.176-2.588) | 0.085§ |
| High ≥3 n (%) | 32 (18.82) | 3 (23.08) | 29 (18.47) | 0.713‡ |
| Low n (%) | 138 (81.18) | 10 (76.92) | 128 (81.53) | |

Statistical tests used: * – Independent Sample T-test; § – Mann-Whitney U test; † – Chi-square test; ‡ – Fisher's exact test

patients with T1DM were significantly higher than those with T2DM (9.60, IQR 9-11.20 vs 8.20 IQR 6.60-10.07; $p$ = 0.015). Ninety-three percent (93%) of patients with T2DM were on oral antidiabetic medications alone, while 50% were on insulin. Most of the patients had retinopathy (66.47%) as a complication and a low DDS score (81.18%), which notably were not different based on DM type.

Among patients with T2DM, low emotional burden (r = 0.31; $p$-value <0.001), low regimen distress (r = 0.39; $p$-value <0.001), and low physician distress (r = 0.27; $p$-value = 0.004) showed weak and direct correlations with HbA1c level. Among patients with T1DM, only high emotional burden was seen to have a perfect and direct relationship, although it was not statistically significant ($p$-value >0.999) (Table 2).

Among distress score domains, physician distress was significantly associated with the diabetes subset ($p$-value = 0.008). Patients with T1DM had significantly higher physician distress scores (median 3.25, IQR 2.25-3.50) than those with T2DM (median 1.75, IQR 1.25-3). Patients with T1DM (n = 13) were 3.25 times more likely (53.85% with high scores) to have physician distress. Patients with T1DM and patients with T2DM had low distress scores for emotional burden, regimen distress, and interpersonal distress (Table 3).

As seen in Table 4, all instrument domains presented good internal reliability. The highest internal consistency was seen for regimen distress, with a Cronbach alpha of 0.877. This domain includes items 5, 6, 10, 12, 16. Meanwhile, the lowest Cronbach alpha was seen for physician distress with a value of 0.81. These are items 2, 4, 9, and 15.

In the factor analysis, we identified four factors that align with the original diabetes distress scale. Factor 1 is linked to emotional burden, factor 2 is associated with regimen distress, factor 3 seems to correlate with interpersonal distress, and factor 4 is tied to physician-related distress. Items 15 and 16 show cross-loading for two factors, with

**Table 2.** Correlation and comparison between high- and low- distressed patients on hemoglobin A1C (HbA1c) (n=170)

| | HbA1c (Mean ± SD) | Correlation coefficient | Interpretation | *p*-value |
|---|---|---|---|---|
| **Type 1** | | | | |
| ***Emotional burden*** | | | | |
| High ≥3 | 10.05 ± 1.63 | 1 | Perfect, direct | >0.999 |
| Low | 10.56 ± 3.16 | -0.1160 | Very weak, indirect | 0.734 |
| ***Regimen distress*** | | | | |
| High ≥3 | 9.62 ± 0.98 | 0.1160 | Very weak, direct | 0.827 |
| Low | 11.21 ± 3.87 | -0.4077 | Moderate, indirect | 0.364 |
| ***Interpersonal distress*** | | | | |
| High ≥3 | 11.20 ± 0 | - | - | - |
| Low | 10.42 ± 3.05 | 0.2281 | Weak, direct | 0.476 |
| ***Physician distress*** | | | | |
| High ≥3 | 10.16 ± 1.68 | 0.2594 | Weak, direct | 0.574 |
| Low | 10.85 ± 4.10 | 0.2648 | Weak, direct | 0.612 |
| **Type 2** | | | | |
| ***Emotional burden*** | | | | |
| High ≥3 | 8.36 ± 2.19 | 0.1166 | Very weak, indirect | 0.625 |
| Low | 8.59 ± 2.48 | 0.3054 | Weak, direct | <0.001 |
| ***Regimen distress*** | | | | |
| High ≥3 | 9.36 ± 2.30 | -0.0372 | Very weak, indirect | 0.808 |
| Low | 8.24 ± 2.43 | 0.3856 | Weak, direct | <0.001 |
| ***Interpersonal distress*** | | | | |
| High ≥3 | 8.56 ± 2.45 | -0.0944 | Very weak, indirect | 0.692 |
| Low | 8.56 ± 2.44 | 0.1404 | Very weak, direct | 0.102 |
| ***Physician distress*** | | | | |
| High ≥3 | 9.10 ± 2.34 | -0.0248 | Very weak, indirect | 0.874 |
| Low | 8.36 ± 2.45 | 0.2654 | Weak, direct | 0.004 |

Interpretation of correlation coefficients: (+) – direct, (-) – indirect; 0 – no correlation; (0-0.2] – very weak, (0.2- 0.4] – weak, (0.4-0.6] – moderate, (0.6-0.8] – strong, (0.8-1.0) – very strong, 1.0 – perfect.

**Table 3.** Comparison of distress scores between patients with T1DM and T2DM (n=170)

| | Total (n=170) | T1DM (n=13) | T2DM (n=157) | *p*-value |
|---|---|---|---|---|
| | Frequency (%); Median (IQR) | | | |
| ***Emotional burden*** | 1.40 (1-2.20) | 1.40 (1.20-2.40) | 1.40 (1-2.20) | 0.576§ |
| High ≥3 | 22 (12.94) | 2 (15.38) | 20 (12.74) | 0.677‡ |
| Low | 148 (87.06) | 11 (84.62) | 137 (87.26) | |
| ***Regimen distress*** | 2.10 (1.20-3.20) | 2.60 (1.80-4.20) | 2 (1.20-3.20) | 0.206§ |
| High ≥3 | 119 (70) | 6 (46.15) | 45 (28.66) | 0.213‡ |
| Low | 51 (30) | 7 (53.85) | 112 (71.34) | |
| ***Interpersonal distress*** | 1 (1-2) | 1 (1-2.667) | 1 (1-2) | 0.548§ |
| High ≥3 | 21 (12.35) | 1 (7.69) | 20 (12.74) | >0.999‡ |
| Low | 149 (87.65) | 12 (92.31) | 137 (87.26) | |
| ***Physician distress*** | 2 (1.25-3) | 3.25 (2.25-3.50) | 1.75 (1.25-3) | 0.008§ |
| High ≥3 | 120 (70.59) | 7 (53.85) | 43 (27.39) | 0.058‡ |
| Low | 50 (29.41) | 6 (46.15) | 114 (72.61) | |

Statistical tests used: § – Mann-Whitney U test; ‡ – Fisher's exact test

**Table 4.** Measure of internal reliability using Cronbach α (n=170)

| Domain (Item number) | Cronbach α |
|---|---|
| ***Emotional burden (1, 3, 8, 11, 14)*** | 0.855 |
| ***Physician distress (2, 4, 9, 15)*** | 0.818 |
| ***Regimen distress (5, 6, 10, 12, 16)*** | 0.877 |
| ***Interpersonal distress (7, 13, 17)*** | 0.848 |

Interpretation of Cronbach α: >0.9 and up – Excellent; 0.8 to <0.9 – Good; 0.7 to <0.8 – Acceptable; 0.6 to <0.7 – Questionable; 0.5 to ≤ 0.6 – Poor; <0.5 – Unacceptable.

Item 15 relating to interpersonal and physician-related distress and Item 16 relating to regimen and interpersonal distress. Each item has a uniqueness value of less than 0.60, indicating that it is explained in conjunction with the other items in the subset (Table 5).

## DISCUSSION

Our main objective was to validate a Filipino version of the Diabetes Distress Scale. The Filipino version showed good internal reliability and was able to extract four factors similar to the original diabetes distress scale [interpersonal distress (ID), emotional burden (EB), regimen-related distress (RR), and physician-related distress (PD)].

**Table 5.** Factor analysis of questions per subset of the Diabetes Distress Scale (n = 170)

| Item | Domain | Description | Four extracted factors of DDS | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | Uniqueness |
| ***17*** | ID | Feeling that friends or family don't give me the emotional support that I would like. | 0.1778 | 0.1576 | 0.6823 | 0.2991 | 0.3885 |
| ***13*** | ID | Feeling that friends or family don't appreciate how difficult living with diabetes can be. | 0.4008 | 0.0678 | 0.6208 | 0.2872 | 0.3669 |
| ***7*** | ID | Feeling that friends or family are not supportive enough of self-care efforts (e.g., planning activities that conflict with my schedule, encouraging me to eat the "wrong" foods). | 0.3210 | 0.2047 | 0.5675 | 0.3937 | 0.3780 |
| ***14*** | EB | Feeling overwhelmed by the demands of living with diabetes. | 0.6047 | 0.3063 | 0.4541 | 0.0549 | 0.3313 |
| ***3*** | EB | Feeling angry, scared, and/or depressed when I think about living with diabetes. | 0.6690 | 0.1033 | 0.1269 | 0.3435 | 0.4076 |
| ***1*** | EB | Feeling that diabetes is taking up too much of my mental and physical energy every day. | 0.5790 | 0.3765 | 0.1499 | 0.1283 | 0.4841 |
| ***11*** | EB | Feeling that I will end up with serious long-term complications, no matter what I do. | 0.5597 | 0.3019 | 0.2307 | 0.2196 | 0.4942 |
| ***8*** | EB | Feeling that diabetes controls my life. | 0.6273 | 0.3228 | 0.3208 | 0.1903 | 0.3632 |
| ***15*** | PD | Feeling that I don't have a doctor who I can see regularly enough about my diabetes. | 0.1485 | 0.2557 | 0.4511 | 0.4135 | 0.5381 |
| ***2*** | PD | Feeling that my doctor doesn't know enough about diabetes and diabetes care. | 0.1709 | 0.1469 | 0.1590 | 0.7293 | 0.3920 |
| ***9*** | PD | Feeling that my doctor doesn't take my concerns seriously enough. | 0.0572 | 0.2431 | 0.3868 | 0.5994 | 0.4287 |
| ***4*** | PD | Feeling that my doctor doesn't give me clear enough directions on how to manage my diabetes. | 0.2478 | 0.0332 | 0.1473 | 0.7613 | 0.3362 |
| ***5*** | RD | Feeling that I am not testing my blood sugars frequently enough. | 0.1638 | 0.7006 | 0.0209 | 0.3278 | 0.3744 |
| ***12*** | RD | Feeling that I am not sticking closely enough to a good meal plan. | 0.3138 | 0.6259 | 0.3829 | 0.0069 | 0.3632 |
| ***16*** | RD | Not feeling motivated to keep up my diabetes self-management. | 0.3412 | 0.5233 | 0.5726 | 0.0389 | 0.2803 |
| ***6*** | RD | Feeling that I am often failing with my diabetes routine. | 0.2779 | 0.7961 | 0.1855 | 0.1577 | 0.2298 |
| ***10*** | RD | Not feeling confident in my day-to-day ability to manage diabetes. | 0.4959 | 0.5424 | 0.2819 | 0.1030 | 0.3698 |

Note: cut-off = 0.40; blank means <0.40; Uniqueness <0.6 – related within the subset
Abbreviations: ID – interpersonal distress; EB – emotional burden; PD – physician distress; RD – regimen distress

The study recruited 170 participants, excluding the 30 participants in the pilot test. This was more than the minimum required for a factor analysis, which was 100.[23] This also met the sample required for validation testing of 5-10 participants per item to be validated.[24]

Contrary to the study of Chew et al., which used the Malay version of the DDS for individuals with T2DM, our results showed a weak correlation between glycemic control (HbA1c level) and diabetes distress. Low emotional burden, regimen distress, and physician distress have shown weak and direct correlations with HbA1c levels. Filipinos are colloquially known to be easy-going, and that culture of *"bahala na,"* or leaving things up to fate or the divine, further promulgates indifference and accepting things as they are.[25] The majority of the respondents in this study, despite poor glycemic control and the presence of comorbidities, responded to the items on the scale as "not a problem," which accounts for low distress scores in the results. Our results were similar to the local study by Totesora et al., where they did not find a statistically significant association between emotional distress and glycemic control.

We did not find a significant association between poor glycemic outcomes and high distress score domains for patients with T1DM and T2DM. Our findings contrast with a study by Cechetti in Brazil, which found that 53% of patients with T1DM and HbA1c levels >7.6% experienced high emotional distress.[26]

Physician variability may be a factor for the significant difference in distress scores between patients with T1DM and T2DM. Our institution is part of a government-subsidized healthcare system, and patients often cannot choose their attending physician. Additionally, the patients with T1DM included in our study have just transitioned from the pediatric clinic. Compared to when their pediatric endocrinologists constantly saw them, they have just started seeing adult endocrinologists. This may be a contributing factor as to why physician distress emerged as the significant factor for patients with T1DM.

All domains showed good internal reliability with the resulting Cronbach $\alpha$ greater than 0.8, ranging from 0.81 to 0.87 for all four domains. This result is in line with the original DDS17. It is also comparable to the Malay version, which has a high internal consistency of 0.94.[17] the Thai DDS with Cronbach alpha of 0.95[27] and the Bahasa version, which has an internal consistency of 0.78 to 0.83.[15]

We were able to extract four factors during factor analysis: Factor 1 appeared to represent the emotional burden domain, Factor 2 included those in the regimen distress, Factor 3 contained items related to interpersonal distress, and Factor 4 contained items regarding physician-related distress. The extracted four factors were similar to the original DDS17. Most of the items with cross-loading are evident in items related to physician and regimen distress. Item number 15, "Feeling that I don't have a doctor who I can see regularly enough about my diabetes," has been factored under both interpersonal distress and physician-related distress. This phenomenon could be explained by the institution's system, which often does not allow patients to choose their attending physician. This is comparable to what was reported in China by Ting et al., wherein they had cross-loading of item number 12, "Feeling that I am not sticking closely enough to a good meal plan, and 15, "Feeling that I don't have a doctor who I can see regularly enough about my diabetes."[28] These findings were also seen

**Table 6.** Comparison of the Filipino, Malay, Indonesian, and Thai Diabetes Distress Scales

| | Filipino Diabetes Distress Scale | Malay Diabetes Distress Scale[17] | Indonesian Diabetes Distress Scale[15] | Thai Diabetes Distress Scale[27] |
|---|---|---|---|---|
| ***Participants*** | 170 outpatients | 262 outpatients | 324 outpatients (246 from the hospitals and 78 from the primary health care centers) | 170 (particularly elderly outpatients) |
| ***Internal Consistency (Cronbach alpha)*** | 0.81 - 0.87 lowest: 0.818 (Physician Distress), highest 0.87 (Regimen Distress) | 0.93, lowest: 0.823 (physician-related distress), highest: 0.925 (regimen distress and interpersonal distress) | 0.78 - 0.83, lowest value - 0.78 regimen distress, highest 0.83 (interpersonal distress and physician distress) | 0.95, highest item correlation with Emotional and regimen-related burden, lowest with Physician-related distress |
| ***Construct Validity (Factor Analysis)*** | Extracted four factors similar to the original diabetes distress scale: Factor 1 – Emotional burden, factor 2 – regimen distress, factor 3 – interpersonal distress, factor 4 – physician-related distress | Extracted three factors – combined regimen and interpersonal distress, emotional burden, physician-related distress | Extracted four similar factors | Three extracted factors – emotional & regimen-related burden, physician distress, interpersonal distress. |

in the Malay version, wherein they merged interpersonal and regimen-related distress. Similarly for the Thai DDS, the emotional burden and regimen-related distress were considered as a single factor.[27] Socio-economic and cultural factors must be considered particularly for items relating to regimen distress: number 16, "Not feeling motivated to keep up my diabetes self-management," as our respondents mostly belong to the financially challenged sector, and the majority are unemployed.[5] Diabetes management entails not only medical but also behavioral and lifestyle changes. Given the background of the participants in this study, the financial cost of management can be considered a factor, and it can add further distress. Aside from the cost, the Filipino culture of having "*fiestas*" or having celebrations with food can be challenging for patients to manage their diet.[29] Furthermore, item 16 had cross-loading with factors 2 and 3 for regimen and interpersonal distress. Based on a content analysis by Francisco et al., one of the prevalent themes to be considered in the Filipino population should be socio-economic factors, as the cost of medications and lifestyle changes are key factors to consider in management. Additionally, Filipino families are closely knit and can act as patients' caregivers. Depending on their approach to the patient, they can aggravate or alleviate distress by monitoring patient adherence to diet and medication.[29]

## CONCLUSIONS AND RECOMMENDATIONS

The Filipino DDS showed good internal reliability and consistent results compared to the original diabetes distress scale. However, it did not reveal a significant correlation between high levels of diabetes-related distress and poor glycemic outcomes.

Subsequent research should focus on individuals with T2DM, as they represent a distinct subset of patients. For those with T1DM, evaluations using a specialized scale are appropriate, indicating the need for further studies to explore and understand this particular group of patients more comprehensively.

### Limitations

A limitation of our study was that we did not compare our tool to other diabetes-related health measures or any other tool for depression. Further analysis may also be done to correlate subsets with complications contributing to high distress scores. A focus-group discussion may also be done in subsequent studies to explore other socio-cultural factors that may contribute to diabetes-related distress. Another limitation of our study was that test-retest reliability could have been measured to further determine the construct's stability. Additionally, the researchers only specified the ability to read, write, and understand the Filipino language in the inclusion criteria. Further assessment of fluency in the Filipino language was not done. As this study only included diabetic patients from the outpatient department, the sample can be considered to represent those with better health-seeking behavior. Another study should assess those in the community for potentially different results.

**Statement of Authorship**
All authors certified fulfillment of ICMJE authorship criteria.

**CRediT Author Statement**
**MRP:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data Curation, Writing – original draft preparation, Writing -review and editing, Visualization, Supervision. Project administration, Funding analysis; **IJG:** Conceptualization, Methodology, Writing – review and editing, Visualization, Supervision, Project administration

**Author Disclosure**
The authors declared no conflict of interest.

**Data Availability Statement**
Datasets are not publicly available because participants in the study did not give written consent for their data to be shared.

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## APPENDICES

**Table 1.** Content validity of the Diabetes Distress Scale(n=8)

| Question Items | Item Relevance Rating | | | | I-CVI | Decision |
|---|---|---|---|---|---|---|
| | Not Relevant | Somewhat Relevant | Quite Relevant | Highly Relevant | | |
| 1. Pakiramdam na ang Diyabetes ay kinukuha ng labis ang aking mental at pisikal na enerhiya araw-araw | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 2. Pakiramdam na walang sapat na kaalaman ang aking Doktor tungkol sa Diyabetes at sa pangangalaga nito. | 0% | 0% | 1 (12.5%) | 7 (87.5%) | 1 | Accept |
| 3. Nakakaramdam ng galit, takot, o panlulumo kapag naiisip ko ang pagkakaroon ng Diyabetes. | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 4. Pakiramdam na hindi ako binibigyan ng aking Doktor ng sapat at malinaw na direksyon kung paano aaksyonan ang aking Diyabetes. | 0% | 0% | 1 (12.5%) | 7 (87.5%) | 1 | Accept |
| 5. Pakiramdam na hindi ako nagtetest ng aking asukal madalas at sapat. | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 6. Pakiramdam na hindi ko nasusundan ang aking diabetes routine | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 7. Pakiramdam na ang aking mga kaibigan o pamilya ay walang suporta sa mga pangangalaga ng sarili (hal. Pagplano ng mga aktibidad na salungat sa aking schedule, pagkain ng “maling” pagkain) | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 8. Pakiramdan na kinokontrol ng diabetes ang aking buhay | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 9. Pakiramdam na hindi sineseryo ng aking doctor ang aking mga pag-aalala | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 10. Walang kompyansa sa aking sarili sa pang-araw-araw na kakayahan i-manage ang aking diabetes | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 11. Pakiramdam na magkakaron parin ako ng malubhang pang-matagalang komplikasyon ng diabetes kahit anong gawin ko | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 12. Pakiramdam na hindi ako sumusunod ng masinsinan sa isang mabuting meal plan | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 13. Pakiramdam na hindi naaappreciate ng mga kaibigan o pamilya kung gaano kahirap ang mabuhay nang may diabetes | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 14. Pakiramdam na nalulula sa mga dapat sundin sa isang pamumuhay na may diabetes | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 15. Pakiramdam na wala akong doctor na maaari kong pag-followup na madalas para sa aking diabetes | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 16. Hindi nararamdaman ang pagkagana na panatilihin ang pansariling pamamahala ng diabetes. | 0% | 0% | 0% | 8 (100%) | 1 | Accept |
| 17. Pakiramdam na ang aking mga kaibigan at kamag-anak ay hindi nagbibigay ng emosyon na suporta na aking gusto. | 0% | 0% | 0% | 8 (100%) | 1 | Accept |

**Table 2.** Initial assessment of internal reliability (n=30)

| Domain (Item Number) | Cronbach α |
|---|---|
| ***Emotional burden (1,3,8,11,14)*** | 0.802 |
| ***Physician distress (2, 4, 9, 15)*** | 0.828 |
| ***Regimen distress (5,6,10,12,16)*** | 0.851 |
| ***Interpersonal distress (7, 13, 17)*** | 0.782 |

**Table 3.** Face validity of the Filipino Diabetes Distress Scale (n=30)

| Items | Important | Difficulty in understanding (Frequency %) | Comment |
|---|---|---|---|
| 1. Pakiramdam na ang Diyabetes ay kinukuha ng labis ang aking mental at pisikal na enerhiya araw-araw | | 100% Important | The item is very clear and understandable |
| 2. Pakiramdam na walang sapat na kaalaman ang aking Doktor tungkol sa Diyabetes at sa pangangalaga nito. | | 100% Important | The item is very clear and understandable |
| 3. Nakakaramdam ng galit, takot, o panlulumo kapag naiisip ko ang pagkakaroon ng Diyabetes. | | 100% Important | The item is very clear and understandable |
| 4. Pakiramdam na hindi ako binibigyan ng aking Doktor ng sapat at malinaw na direksyon kung paano aaksyonan ang aking Diyabetes. | | 100% Important | The item is very clear and understandable |
| 5. Pakiramdam na hindi ako nagtetest ng aking asukal madalas at sapat. | | 100% Important | The item is very clear and understandable |
| 6. Pakiramdam na hindi ko nasusundan ang aking diabetes routine | | 100% Important | The item is very clear and understandable |
| 7. Pakiramdam na ang aking mga kaibigan o pamilya ay walang suporta sa mga pangangalaga ng sarili (hal. Pagplano ng mga aktibidad na salungat sa aking schedule, pagkain ng “maling” pagkain) | | 100% Important | The item is very clear and understandable |
| 8. Pakiramdan na kinokontrol ng diabetes ang aking buhay | | 100% Important | The item is very clear and understandable |
| 9. Pakiramdam na hindi sineseryo ng aking doctor ang aking mga pag-aalala | | 100% Important | The item is very clear and understandable |
| 10. Walang kompyansa sa aking sarili sa pang-araw-araw na kakayahan i-manage ang aking diabetes | | 100% Important | The item is very clear and understandable |
| 11. Pakiramdam na magkakaron parin ako ng malubhang pang-matagalang komplikasyon ng diabetes kahit anong gawin ko | | 100% Important | The item is very clear and understandable |
| 12. Pakiramdam na hindi ako sumusunod ng masinsinan sa isang mabuting meal plan | | 100% Important | The item is very clear and understandable |
| 13. Pakiramdam na hindi naaappreciate ng mga kaibigan o pamilya kung gaano kahirap ang mabuhay nang may diabetes | | 100% Important | The item is very clear and understandable |
| 14. Pakiramdam na nalulula sa mga dapat sundin sa isang pamumuhay na may diabetes | | 100% Important | The item is very clear and understandable |
| 15. Pakiramdam na wala akong doctor na maaari kong pag-followup na madalas para sa aking diabetes | | 100% Important | The item is very clear and understandable |
| 16. Hindi nararamdaman ang pagkagana na panatilihin ang pansariling pamamahala ng diabetes. | | 100% Important | The item is very clear and understandable |
| 17. Pakiramdam na ang aking mga kaibigan at kamag-anak ay hindi nagbibigay ng emosyon na suporta na aking gusto. | | 100% Important | The item is very clear and understandable |