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The validity and reliability of the Indonesian version of the Diabetes Mellitus Self-Efficacy Scale (DMSES-I)

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Abstract

Background: The incidence of diabetes mellitus (DM) and its complications is increasing in Indonesia. The patient's quality of life will decrease due to this condition. Diabetes self-management is a viable tactic for improving quality of life and reducing blood sugar levels. A key element of diabetes self-management education for nurses and health professionals is self-efficacy. However, a valid and reliable scale to assess self-efficacy in Indonesia is necessary.

Aims: 'The Diabetes Mellitus Self-Efficacy Scale (DMSES)' is translated into Indonesian for the psychometric assessment of diabetes patients there.

Method: DMSES was translated into the Indonesian version (DMSES-I) using the forward-backward translation method. In addition, 227 adult patients with type 2 diabetes completed the scale which underwent internal consistency, construct validity and content validity tests.

Results: The item content validity and scale validity were 0.955 and 0.955, respectively. Exploratory factor analysis showed a Kaiser–Meyer–Olkin index of 0.922 and a Cronbach's alpha coefficient of 0.928. The confirmatory factor analysis results were chi-square = 76.610, probability = 0.009 and root mean square error of approximation (RMSEA) = 0.049.

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Conclusion: To assess diabetes self-efficacy in Indonesia, the DMSES-I is a valid and reliable tool. To educate diabetes self-management effectively, nurses must assess their patients' diabetes self-efficacy.

Keywords
diabetes mellitus, DMSES-I, forward-backward translation, reliability, self-efficacy, validity

Introduction

Over the past few decades, type 2 diabetes mellitus (T2DM) prevalence has risen steadily, especially in low-income nations (Kemenkes, 2020). According to this tendency, the population is anticipated to grow, reaching 578 million in 2030 and over 700 million in 2045 (Kemenkes, 2020). By 2030, Indonesia will have 21.3 million T2DM patients, up from 8.4 million in 2000, according to the World Health Organization (WHO; PERKENI, 2021). Indonesia has a 10.9% prevalence of diabetes mellitus (DM), based on the 2018 Basic Health Research (Riskesdas) report (PERKENI, 2021). In 2020, 10.8 million people in Indonesia, or 6.2% of the population, had DM. Indonesia is rated third in Southeast Asia with an 11.3% prevalence and seventh in the globe with 10.7 million people, according to the Indonesian Ministry of Health (Kemenkes, 2020).

DM is Indonesia's third-leading cause of death, with a 6.7% mortality rate (Kemenkes RI, 2018). DM hurts psychological health, decreases patients' quality of life and demands expensive, long-term care (de la Cruz et al., 2020; Jing et al., 2018; Moucheraud et al., 2019; Riddle and Herman, 2018). Managing DM in diabetic individuals is necessary to lessen its impact.

Self-efficacy positively impacts patients' self-management and health behaviour (Rustika. I Made, 2012). Self-efficacy is the conviction that one can take action to accomplish goals. A person with high self-efficacy practises good self-care (Bandura, 1986; Zhang et al., 2023). In general, those with high levels of self-efficacy can take good care of themselves (Malini et al., 2020; Mustarim et al., 2019; Sabil et al., 2019). A Chinese study (Yao et al., 2019) found that patients with T2DM have more excellent self-management behaviour and greater self-efficacy. In Saudi Arabia, self-efficacy was linked to excellent self-management behaviour regarding food, blood sugar testing, exercise and medication use (Saad et al., 2018). According to studies, self-efficacy is substantially connected with successful self-management (Chen et al., 2023; Fajriani et al., 2021).

One of the essential techniques for providing diabetes self-management education is determining the patient's level of self-efficacy. Assessing diabetic self-efficacy accurately is a nursing responsibility. Nurses can give patients the appropriate education based on their needs to improve diabetic self-management behaviour and quality of life (Azami et al., 2018; Hailu et al., 2019; Kusnanto et al., 2019; Mogre et al., 2019). In Indonesia, there is a dearth of reliable and rigorous questionnaires measuring diabetic self-efficacy.

Nurses must utilise a precise assessment tool for determining a diabetic's level of self-efficacy. Nurses can advise patients about how to manage their diabetes so they can manage their disease and have a decent quality of life. The 'Diabetes Management Self-Efficacy Scale (DMSES)' is one of the self-efficacy assessment instruments used with DM patients. In 1999, Van Der Bijl et al. created DMSES. The tasks the patient must perform to manage their diabetes served as the basis for developing this self-efficacy scale. The DMSES was a comprehensive scale that measured 20 different factors, including meal planning, physical activity, foot care and treatment programmes (Van Der Bijl et al., 1999). The Cronbach's alpha coefficient for the total DMSES-I was 0.81, and the test-retest reliability with a 5-week time interval was r 0.79 (*p 0.001).

The DMSES questionnaire has been translated into some languages, including Chinese, Iranian, Greece and Turkish, these scales have good psychometric properties (Fappa et al., 2016; Mankan et al., 2017; Messina et al., 2018; Noroozi and Tahmasebi, 2014; Vivienne Wu et al., 2008). Indonesia needs the DMSES instrument with the Indonesian language and culture. The researcher translated the DMSE instrument into Indonesian and examined its psychometrics. The translation result is the diabetes self-efficacy scale in the Indonesia version (DMSES-I).

Methodology

Design of the study

This study used a cross-sectional design. The researchers referred to the cultural adaptation guidelines, which use a forward–backward translation approach comprising six stages (Beaton et al., 2000).

Setting and participants

Two groups of volunteers were chosen for this study's recruitment. Thirty-six people made up group 1 for the DMSES-I's pretesting and pilot study. These people evaluated the questionnaire's items for clarity and readability. In contrast, the members of group II were chosen for psychometric testing of the scale. According to Guilford's Rule, at least 200 people must participate in psychometric testing (Guilford et al., 1954). Adults with T2DM who can speak Indonesian, who do not have communication issues or mental disorders like depression or other mental illnesses, and who are ready to participate in the study were the requirements for participation in both groups. This study was conducted at the internal medicine outpatient clinic of a private hospital in Indonesia, from March to July 2022, with approval from the review board with approval registration number Ref. No: KE/FK/0304/EC/2022.

Questionnaire: DMSES

This self-efficacy scale was created based on patients' self-care tasks to control their diabetes (Van Der Bijl et al., 1999). Twenty questions make up the DMSES. Measured aspects include self-management competence, including:

1. Blood sugar monitoring (three question items)
2. Diet settings and maintaining ideal body weight (eleven question items)
3. Physical activity (two question items)
4. Foot care (one question item)
5. Follow the treatment programme (three question items)

The items use a Likert scale of 0 to 10, with ratings of 0 if they cannot do it at all, 10 certainly can do it, and five if sometimes (maybe yes, maybe no). Interpretation used the mean for each aspect. For the overall score, the higher the average, the better one's self-efficacy.

The original version of the DMSE was developed in the Netherlands and then translated into various languages namely Chinese, Iranian, Greek and Turkish. The translation results found that the instrument was valid and reliable with Cronbach's alpha 0.77–0.93 in Chinese, 0.92 in Iranian, 0.93 in Greek and 0.86 in Turkish.

Study procedure

Translation procedure. Jaap Van der Bijl, the developer, granted the authors' request for permission. A cross-cultural adaptation process based on Beaton's et al guidelines. Beaton et al. (2000) was used to undertake the translation validation. A sworn translator (T1) and a nurse with clinical expertise specialising in medical-surgical nursing and nurse education (T2) collaborated to translate DMSES into Indonesian. Both translators agreed upon the output. Two English translators separately translated the Indonesian version back into English. A pretest was undertaken after the forward–backward translation and expert review procedures had finished (Figure 1). This was done to ensure that the material was accurate.

The expert committee consisted of 10 people, including 2 consultant specialists in endocrine metabolism, 4 nurses working in the endocrine clinic, 2 nursing lecturers in the medical surgical nursing area, a dietitian and an English language expert. The expert committee evaluated the instrument by giving each item a score between one and four (one being irrelevant and four being extremely relevant). The experts evaluated whether it was required to change or eliminate items and offered suggestions for already-existing items.

Validation process. The researchers identified patients according the established criteria, namely Type 2 DM patients, can speak Indonesian, do not have communication disorders or psychological disorders such as depression or other mental disorders, are willing to be respondents. The researchers used two stages: first, a pretesting and second, psychometric testing. Stage I: pretesting. A pretest involved 36 participants recruited in an internal medicine outpatient clinic at a private hospital to assess the questions' clarity and ease of understanding. The pretest stage was conducted between March 23 and April 13, 2022.

Stage II: psychometric testing. In the psychometric testing, the researchers involved 227 participants in the internal medicine outpatient clinic. The researchers collected data from April 22 to July 23, 2022 criteria by examining the medical record. The researchers explained the research objectives and asked patients for approval to be a respondent. If the patient understood and agreed, then they signed the consent form. The researcher assisted participants who needed help to complete the questionnaire independently by filling up the items based on their responses.

Data analysis

Validity of content. The Item-Content Validity Index (I-CVI) and the Scale-Content Validity Index (S-CVI) were used to evaluate the content validity of the DMSES-I. S-CVI can be calculated in two ways: by averaging the I-CVI scores for each item on the scale (S-CVI/Ave) and by determining the percentage of items on the scale that receive a relevance value of 3 or 4 from all experts (S-CVI/UA).

I-CVI, also known as (agreed item)/(number of experts), is the percentage of material for which the experts assign a relevance rating of 3 or 4. The elements were scored by the experts using a 4-point scale (1 being irrelevant and 4 being very relevant), and the scores were then divided into relevant and irrelevant (scores 3 and 4) categories (Yusoff, 2019). According to Lynn (1985), the CVI value for 10 expert reviewers is at least 0.78.

Validity of construct. DSMES-I's concept validity was investigated using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The Kaiser–Meyer–Olkin (KMO) reaches 0.6, the Bartlett's sphericity test is relevant at 0.05 and Eigen-values >1 are criteria that were acceptable for construct validity. An item of scale will be removed if the loading factor is below 0.3 (Jordan and Spiess, 2019; Osborne and Costello, 2009).

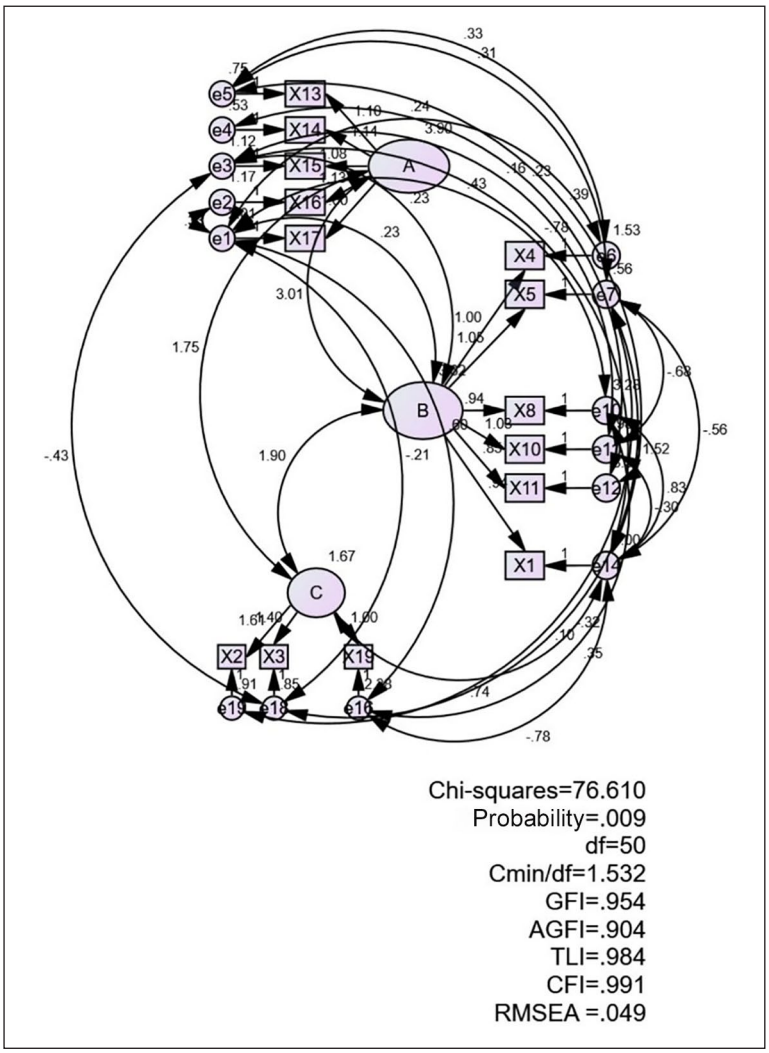

Figure 1. The result of confirmatory Factor Analysis.

Reliability. The internal consistency reliability was evaluated using Cronbach's alpha coefficient. Cronbach's alpha was determined with an acceptable coefficient of >0.70 (Devon et al., 2007).

Results

Participant characteristics

Thirty-six T2DM respondents were included in the first round. The participants' average age was 54.42 (5.71) years, and the disease had been present for 1.72 (1.003) years, with 63.9% of the individuals being female. All patients are from Javanese culture.

In the psychometric assessments, 227 T2DM patients participated. The participants had a gender ratio of 46.70% females, an average age of 56.76 (9.84) years, an average disease duration of 5.83 (5.419) years, 97.8% of the patients were of Javanese descent, and complications affected 18.5% of the participants (Table 1).

Table 1. Characteristics of respondents.

Characteristics	Stage I ($n = 36$)	Stage II ($n = 227$)
Age (year)	Mean (SD)	
Illness duration (year)		
	54.42 ± 5.71	56.76 ± 9.84
	1.72 ± 1.003	5.83 ± 5.419
	f (%)	
Sex		
Male	13 (36.1)	106 (46.7)
Female	23 (63.9)	121 (53.3)
Complications		
IMA	0 (0)	1 (0.4)
Asthma	0 (0)	3 (1.3)
CHF	0 (0)	10 (4.4)
Hypertension	0 (0)	42 (18.5)
OA	0 (0)	1 (0.4)
COPD	0 (0)	6 (2.6)
Stroke	0 (0)	11 (4.8)
None	36 (100)	153 (67.4)
	f(%)	
Ethnicity		
Javanese	36 (100)	222 (97.8)
Sundanese	0 (0)	5 (2.2)

IMA: infarct myocardial acute; CHF: congestive heart failure; OA: osteoarthritis; COPD: chronic obstructive pulmonary disorder.

Content validity

According to experts, clarity of language, applicability and theoretical adherence are all measures of content validity. I-CVI: 955, S-CVI/Ave: 0.955 and S-CVI/UA: 0.955 are acceptable findings for the content validity of the DMSES-I (Lynn, 1985). Furthermore, experts from Indonesia advise changing the terminology for items 8 and 18. The phrase 'I can take enough exercise, for example, walking the dog or riding a bicycle' in item 8 was changed to reflect Indonesian customs or culture better. Change the text in item 18 of the DMSES from 'I can visit my doctor once a year to monitor my diabetes' to 'I can visit my doctor once a month to monitor my diabetes'.

Construct validity

The applicability of the EFA tool for this research dataset was checked using the KMO index. KMO value = 0.922 suggests that factor analysis can be performed. *p* Value 0.000 shows that Bartlett's sphericity test is significant (Table 2).

EFA found 3 factors in 20 questionnaire items, namely nutritional management (5 items), physical exercise and foot care (10 items) and glucose control and medical care (5 items). Factor loadings between 0.177 and 0.823 (Table 3). The factor loading of more than 0.3 can be said that the indicator has good construct validity (Comrey and Lee, 2016; Osborne and Costello, 2009). After that, researchers conducted CFA to test how well the previously formed factors were. The CFA results were chi-square = 76.610, probability = 0.009, df = 50, C_{min}/df = 1.532, GFI = 0.954, adjusted

Table 2. KMO and Bartlett's test.

Kaiser–Meyer–Olkin measure of sampling adequacy.		0.922
Bartlett's test of sphericity	Approx. chi-square	3882.355
	df	190
	Sig.	0.000

goodness-of-fit index (AGFI) = 0.904, Tucker Lewis index (TLI) = 0.984, comparative fit index (CFI) = 0.991 and RMSEA = 0.049 (Figure 1). Model fit based on CFA is nutritional management factor with five items according to EFA, physical exercise and foot care factor with six items, glucose control and medical factor with three items (Table 4). Based on the CFA, the DMSE questionnaire version Indonesia has 14 items.

Reliability

The DMSES-I's Cronbach alpha with 20 items was 0.928. The Cronbach alpha range was 0.921 to 0.952. This implies that everything is trustworthy (Table 5).

Discussion

DMSES's validity and reliability in the Indonesian version

With a forward and backward translation strategy, the validity and reliability of the DMSES in Indonesian were first tested. With a Cronbach's alpha of 0.928, the final version of DMSES-I exhibits internal consistency. All DMSES-I products are regarded as being reliable and legitimate. The internal consistency of the DMSES in the United Kingdom is 0.89 (Sturt et al., 2010); in the Turkish version, it is 0.88 (Kara et al., 2006), and the internal consistency of the original DMSES was 0.81 (Van Der Bijl et al. 1999). Comparing DMSE-I to other research, it has a higher Cronbach's alpha, perhaps due to the more significant number of participants. There were two items adjusted, which are items 8 and 18. The sentence of item 8, 'I am able to take enough exercise, for example, walking the dog or riding a bicycle', was adapted to customs or culture in Indonesia to be walking. Walking has a broader meaning in Indonesia. Among the habits of Indonesian people, most people do not have the habit of walking with pets such as dogs. This alteration does not change the meaning of the item but changes the example so it is adapted to Indonesian culture.

The sentence of item 18, 'I can visit my doctor once a year to monitor my diabetes', was altered to reflect the experts' advice, 'I can visit my doctor once a month to monitor my diabetes'. The diabetes monitoring for Indonesian people is to carry out routine health checks every month. Patients with T2DM should check their health condition regularly, blood sugar levels at least once a month and HbA1C every 3 months in Indonesia. For patients who have controlled DM, their HbA1C levels should be checked at least twice a year (PERKENI, 2021), and a general check-up should be done yearly. The adjustment of these two items has received permission from the original developer, with consideration adapted to the characteristics of the local culture.

EFA found 3 factors for the 20 items, which are nutrition management (5 items), physical exercise and foot care (10 items), and glucose control and medical treatment (5 items). Factor loading is between 0.386 and 0.823 (Table 3). The DMSES item 9, which adjusted the meal plan when sick, had a loading factor of 0.177 (<0.3). The item can be removed because it was below .3 (Comrey and Lee, 2020; Osborne and Costello, 2009). The CFA results of items 6, 7, 12, 18 and 20 have a loading factor of less than 0.5, so they are eliminated. The minimum acceptable loading factor is

Table 3. Exploratory factor analysis of the final DMSES-I.

Item number	Item statement	Factor		
		1	2	3
15	I am able to follow a healthy eating pattern when I am on holiday	0.823		
14	I am able to adjust my eating plan when I am away from home	0.813		
16	I am able to follow a healthy eating pattern when I am eating out or at a party	0.802		
13	I am able to follow a healthy eating pattern when I am away from home	0.802		
17	I am able to adjust my eating plan when I am feeling stressed or anxious	0.714		
8	I am able to take enough exercise, for example, walking or riding a bicycle		0.758	
11	I am able to take more exercise if the doctor advises me to		0.739	
12	When taking more exercise, I am able to adjust my eating plan		0.683	
4	I am able to choose the correct foods		0.555	
10	I am able to follow a healthy eating pattern most of the time		0.550	
6	I am able to keep my weight under control		0.540	
7	I am able to examine my feet for cuts		0.529	
5	I am able to choose different foods and stick to a healthy eating Pattern		0.528	
1	I am able to check my blood sugar if necessary		.455	
3	I am able to correct my blood sugar when the blood sugar level is too low (e.g. eat different food)			0.795
2	I am able to correct my blood sugar when the sugar level is too high (e.g. eat different food)			0.759
19	I am able to take my medication as prescribed			0.620
18	I am able to visit my doctor once a month to monitor my diabetes			0.507
20	I am able to adjust my medication when I am ill			0.386
9	I am able to adjust my eating plan when ill		0.177	
Initial Eigenvalues:				
% of Variance		53.688	7.356	6.780
Cumulative %		53.688	67.825	61.044

DMSES-I: The Diabetes Mellitus Self-Efficacy Scale Indonesian Version.

0.3–0.4, and values >0.5 are generally considered necessary for practical significance (Hair et al., 2010). The DMSE-I fit model has 14 items with 3 factors. factor 1: nutritional management (5 items), factor 2: physical exercise and foot care (6 items) and factor 3: glucose control and medical care (3 items).

This outcome differs from the original DMSES, which included 4 factors: factor 1: nutrition-specific and weight (5 items), factor 2: general nutrition and medical treatment (9 items), factor 3: physical activity (3 items) and factor 4: blood sugar (3 items). The number of respondents is what

Table 4. The confirmatory factor analysis.

Item number			SLF	SE	*p* Value	AVE > 0.5	CR > 0.7
X17	<—	1	0.812	0.000	<0.001	0.81	0.95
X16	<—	1	0.900	0.058	<0.001		
X15	<—	1	0.896	0.063	<0.001		
X14	<—	1	0.952	0.060	<0.001		
X13	<—	1	0.929	0.060	<0.001		
X4	<—	2	0.838	0.000	<0.001	0.6	0.9
X5	<—	2	0.936	0.057	<0.001		
X8	<—	2	0.701	0.074	<0.001		
X10	<—	2	0.892	0.061	<0.001		
X11	<—	2	0.662	0.073	<0.001		
X1	<—	2	0.559	0.109	<0.001		
X19	<—	3	0.642	0.000	<0.001	0.68	0.86
X3	<—	3	0.890	0.124	<0.001		
X2	<—	3	0.909	0.143	<0.001		

SLF: Standardized Loading Factors.

caused this discrepancy. The DMSES-I had 227 participants compared to 94 for the original DMSES. However, the validity and reliability of the instrument are unaffected by this variable variation. The following scale could assess the sample size: 50 represents extremely poor, 100 represents poor, 200 represents fair, 300 represents good, 500 represents very good and 1000 or more represents exceptional (Comrey and Lee, 2020), so the total should be at least 200 (Guilford et al., 1954), and the recommended sample size ranges from 100 to 200 (Mondiana et al., 2018). The larger sample usually leads to a more unambiguous indication of the number of factors.

The final version of DMSES-I is internally consistent, according to a Cronbach's alpha of 0.928. Nurses and other healthcare professionals can assess the diabetes self-efficacy scale for patients with diabetes in Indonesia using the practical and trustworthy DMSES-I tool. Finding the patient's degree of self-efficacy is one of the key strategies for offering diabetes self-management education. Nurses must do accurate assessments of diabetes self-efficacy. Depending on their needs, nurses can give patients the information they need to manage their diabetes better and improve their quality of life (Azami et al., 2018; Hailu et al., 2019; Kusnanto et al., 2019; Mogre et al., 2019).

DMSES was developed to measure self-efficacy in diabetes management such as nutrition management, activities, medication, hypoglycaemia and hyperglycaemia management (Van Der Bijl et al., 1999). Some factors that affect self-efficacy include information resources (performance, verbal persuasion, role modelling, physiological feedback), environment (social support; Smith et al., 2023). In this study, these factors were not measured because they focused on the measuring instrument.

The nursing implication

Nurses can use the DMSES-I instrument to assess the self-efficacy of patients with DM in performing diabetes self-management. Nurses must know the self-efficacy in patients with DM, as a basis for providing motivation and information on diabetes self-management. DMSE can be one of the outcomes that can be established in designing interventions to improve diabetes self-management.

Table 5. The reliability test per item.

No	Item	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
1	I am able to check my blood sugar if necessary	145.31	1131.851	0.582	0.926
2	I am able to correct my blood sugar when the sugar level is too high (e.g. eat different food)	144.37	1145.153	0.759	0.922
3	I am able to correct my blood sugar when the blood sugar level is too low (e.g. eat different food)	144.12	1164.914	0.711	0.924
4	I am able to choose the correct foods	144.48	1148.251	0.751	0.923
5	I am able to choose different foods and stick to a healthy eating pattern	144.35	1144.495	0.833	0.922
6	I am able to keep my weight under control	144.41	1166.357	0.653	0.924
7	I am able to examine my feet for cuts	144.69	1165.099	0.508	0.927
8	I am able to take enough exercise (e.g. walking or riding a bicycle)	144.55	1137.647	0.725	0.923
9	I am able to adjust my eating plan when ill	143.96	1128.698	0.239	0.952
10	I am able to follow a healthy eating pattern most of the time	144.30	1147.315	0.786	0.922
11	I am able to take more exercise if the doctor advises me to	144.47	1148.418	0.687	0.923
12	When taking more exercise, I am able to adjust my eating plan	144.49	1145.331	0.765	0.922
13	I am able to follow a healthy eating pattern when I am away from home	144.52	1137.844	0.803	0.922
14	I am able to adjust my eating plan when I am away from home	144.59	1134.190	0.806	0.921
15	I am able to follow a healthy eating pattern when I am on holiday	144.51	1142.233	0.747	0.922
16	I am able to follow a healthy eating pattern when I am eating out or at a party	144.70	1135.211	0.760	0.922
17	I am able to adjust my eating plan when I am feeling stressed or anxious	144.67	1139.533	0.759	0.922
18	I am able to visit my doctor once a month to monitor my diabetes	143.77	1178.118	0.542	0.926
19	I am able to take my medication as prescribed	143.46	1192.471	0.521	0.927
20	I am able to adjust my medication when I am ill	143.63	1151.065	0.565	0.926

Strengths and limitations of the study

According to the Guidelines for Cross-Cultural Adaptation of Self-Report Measures (Beaton et al., 2000), this study's validation and reliability process adhered to a precise methodology using various techniques. Additionally, the sample size of 227 participants is considered appropriate for factor analysis and offers solid proof that the DMSES-I is valid and reliable for Indonesian adults with DM.

Our study has several drawbacks. Only two private hospitals served as the data collection sites; most participants were of Javanese culture and came from rural areas. Therefore, participants in future studies should come from urban parts of the nation and use government hospitals. This study did not measure factors that influence self-efficacy assessment and correlate with other variables such as social support, psychological status, economic status and self-management.

Conclusions

The DMSES-I is a valid and reliable tool for assessing self-efficacy in the Indonesian population, especially in patients with T2DM receiving primary healthcare. It is essential to encouraging health education for a nurse to enhance diabetes self-efficacy, which influences the management behaviour and quality of life of patients with type 2 diabetes.

For measuring the self-efficacy of diabetic patients in Indonesia, there is a new tool called the DMSES-I. The DMSES-I is a tool that nurses, in particular, can use to assess patients with T2DM's level of self-efficacy. Nurses can provide appropriate health education based on these assessment results. High self-efficacy T2DM patients are more likely to be able to effectively control diabetes behaviour, lowering complications and enhancing their quality of life.

Key points for policy, practise and/or research

- The Indonesian DMSES (DMSES-I) is a 20-item scale to measure diabetes self-efficacy in Indonesia.
- The Indonesian DMSES version's psychometric characteristics for T2DM demonstrate good validity and reliability.
- Healthcare providers, such as nurses, could assess self-efficacy more accurately with the validated Indonesian version of the DMSES for people with T2DM.
- Nurses and other healthcare professionals can use the DMSES-I as a foundation for diabetes management education.

Author contributions

Theresia Titin Marlina: Study conception and design, Data collection, Data analysis and interpretation, Drafting of the article, Critical revision of the article.
Widyawati: Study conception and design, Data analysis and interpretation, Drafting of the article, Critical revision of the article.
Haryani: Study conception and design, Data analysis and interpretation, Drafting of the article, Critical revision of the article.

Declaration of conflicting interests

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Ethical approval

The study was approved by the Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada – Dr. Sardjito General Hospital. The approval number: Ref No. KE/FK/0304/EC/2022, date approval 22 March 2022.

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