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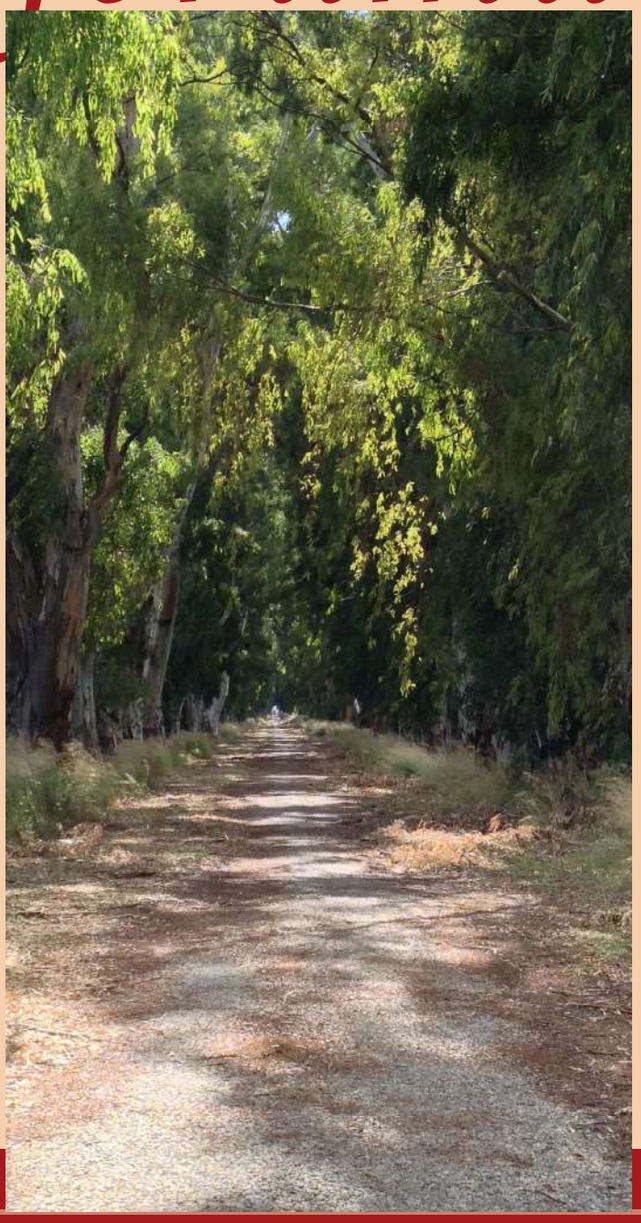

Editör: **Nermin OLGUN**

Temmuz - Aralık 2020

Cilt 12 - Sayı 2

ISSN 1301-9880

Dergi Adı
Hemşirelik Forumu
Diyabet, Obezite ve Hipertansiyon
(Özel sayı)

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Hemşirelik Forumu
Bilmedya Grup yayınıdır

ISSN 1301-9880

Cilt 12 - Sayı 2

Temmuz - Aralık 2020

İçindekiler

Psychometric Properties of the Perceived Diabetes Self-Management Scale in Turkish Patient with Type 2 Diabetes

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Araştırma

Summary

Objectives: *This study aimed at investigating the psychometric characteristics of the Perceived Diabetes Self-Management Scale (PDSMS) in Turkish population with type-2 diabetes.*

Methods: *In this methodological study, 263 patients were recruited. The language validity of PDSMS was tested. The psychometric properties of the Turkish PDSMS (T-PDSMS) were examined by internal consistency, stability, confirmatory factor analysis, and construct, predictive, and concurrent validity.*

Results: *Internal consistency coefficient a of the total scale was found to be 0.77. It was found that the exploratory factor analysis explained 47.96% of the total variance. The factor loading ranged from 0.39 to 0.65 for 7 items. The confirmatory factor analysis yielded good fitness indexes; the norm χ2 was 19.11, χ 2/df value was lower than 2, GFI was 0.95, CFI was 0.99, SRMR was 0.02, and RMSEA was 0.037. The GFI (0.95) was over 0.8, while RMSEA (0.037) and SRMR (0.02) were under 0.05. The confirmatory factor analysis revealed that the T-PDSMS was acceptable. The instrument showed a good reliability and concurrent validity with the Diabetes Self-Efficacy Scale and the Health Belief Model Scale (p:0.000). In the evaluation of predictive validity, the PDSMS scores were correlated with various parameters including BMI, FBG, PPG, and HbA1c.*

Conclusions: *The validity and reliability of the T-PDSMS, which consists of 7 items and one dimension, were confirmed for the clinical use by nurses.*

Keywords: *Diabetes mellitus, Self-efficacy, Perceived diabetes self-management, Reliability, Validity.*

Özet

Tip 2 Diyabetli Türk Hastada Algılanan Diyabet
Kendi Kendini Yönetme Ölçeğinin Psikometrik Özellikleri

Amaç: *Bu çalışmanın amacı, Tip 2 diyabetli Türk Toplumu'nda Algılanan Diyabet Kendi Kendini Yönetme Ölçeği'nin (PDSMS) psikometrik özelliklerini incelemektir.*

Yöntem: *Bu çalışma tasarımı metodolojiktir. Çalışmaya 263 hasta katıldı. PDSMS'nin dil geçerliliği test edildi. Türk PDSMS'nin (T-PDSMS) psikometrik özellikleri iç tutarlılık, kararlılık, yapı geçerliliği, doğrulayıcı faktör analizi, eşzamanlı geçerlilik ve öngörücü geçerlilik ile incelenmiştir.*

Bulgular: *Toplam ölçeğin iç tutarlılığı 0.77'dir (cronbach α). Bulgular, açımlayıcı faktör analizinin toplam varyansın% 47.96'sını açıkladı. Faktör yükü 7 madde için 0.39 ile 0.65 arasında değişmektedir. Doğrulayıcı faktör analizi iyi uyum indekslerine sahipti; norm χ2 19.11, χ 2 / df değeri 2'den düşük, GFI 0.95, CFI 0.99, SRMR 0.02 ve RMSEA 0.037 idi. GFI (0.95) 0.8'in üzerinde iken RMSEA (0.037) ve SRMR (0.02) 0.05'in altında bulundu. Doğrulayıcı faktör analizi, T-PDSMS'nin kabul edilebilir olduğunu ortaya koydu. Skala Sağlık İnanç Modeli Ölçeği ve Diyabet Öz-Yeterlik Ölçeği ile iyi bir güvenilirlik ve eşzamanlı geçerlilik (p: 0.000) gösterdi. Tahmini geçerlik değerlendirmesinde PDSMS puanları, BMI, FBG, PPG ve HbA1c gibi çeşitli parametrelerle ilişkilendirilmiştir (p*

Author's Note: *This article is derived from the author's doctoral thesis titled "The Relationship Between Cardiovascular Risk Factors and Health Belief and Self-Efficacy in Type 2 Diabetics".*

<0.001).

***Sonuç:** 7 maddeden ve tek boyuttan oluşan T-PDSMS, hemşireler tarafından klinik kullanıma hazır, geçerli ve güvenilir bir ölçme aracıdır.*

***Anahtar Kelimeler:** Diabetes mellitus, Öz-yeterlik, Algılanan diyabetin kendi kendine yönetimi, Güvenilirlik, Geçerlilik.*

Introduction

Diabetes is one of the leading global health emergencies of this century across the world (1) International Diabetes Federation (IDF) reports that the number of the patients with diabetes mellitus in the world is 425 million as of 2017, and this number is estimated to rise to 629 million in 2045 with an increase of 48%. Again, according to the estimations in the IDF diabetes atlas, the prevalence of diabetes in the age group of 20-79 is 12.8%. The prevalence of diabetes in the Turkish community is 12.8%, which ranks the third after Germany and Russian Federation in Europe (2). TURDEP-II (Turkish Epidemiology Survey of Diabetes, Hypertension, Obesity, and Endocrine Disease) reports that 16.5% of the Turkish people have diabetes (3).

Diabetes should be managed comprehensively based on a plan (4). In addition, patients with diabetes mellitus should manage this disease themselves to reach an optimum outcome (5). In case of a poor management, all types of diabetes can cause some complications, especially cardiovascular diseases, stroke, and renal diseases (2, 4).

Patients' self-efficacy beliefs about diabetes significantly affect their ability to cope with diabetes process in self-care management (6, 7). Self-efficacy refers to the beliefs that one is able to successfully exhibit behaviors necessary to reach given outcomes (8). It affects not only the individuals' choice of behaviors, but also how they motivate themselves to accomplish a given task under their responsibility (9,10).

Diabetes is a chronic disease progressing with macrovascular and microvascular complications (cardiovascular, retinopathy, nephropathy, neuropathy, diabetic foot ulceration, encephalopathy, etc.) (2). Performing complex care activities is an important part of successfully preventing the complications (11). In several studies on diabetes in the literature, it has been reported that self-efficacy is associated with the self-care activities of diabetes management (6,7). It has been asserted that self-efficacy is a significant factor in health outcomes such as HbA1c, Body Mass Index (BMI), Post-prandial glucose (PPG) level, and Fasting Blood Glucose (FBG) level (12-14).

In a study assessing the relationships between self-care and -efficacy strengths of diabetic patients, it was found that the level of self-efficacy related to nutrition and insulin treatment increased in the cases who participated in diabetes training programs and who were visited by a home care nurse (15). In another study, individuals with a low self-efficacy level were reported to have insufficient diabetes-related self-care behaviors and to fail in diabetes management (16). It is thought that the evaluation of disease-related self-efficacy levels of individuals will be useful for an effective and successful diabetes self-care.

The scale was modified from the Perceived Health Competence Scale (PHCS) by Wallston et al. (2007). It has one dimension and consists of 8 items about how the diabetic individual perceives oneself on diabetes-specific health outcomes and self-management (self-efficacy) (5). There are various scales that evaluate diabetes-related self-efficacy and self-care behavior responses in Turkish community (17,18). Health Belief Model Scale (HBMS) (17) and Diabetes Self-Efficacy Scale (DSES) have been translated and validated for the patient with Diabetes Mellitus in Turkish culture (18). Both scales are frequently used in studies on Turkish community. However, both scales are too long for use in clinical practice and research. It is difficult to use both scales for field studies with a large sample size. With epidemic increase of diabetes and its burden, health professionals need to spend more effort to improve diabetes self-management of people (19). Therefore, there is a need for shorter and more practical tools to assess self-management behaviors of Turkish people with diabetes. The purpose of this study was to test whether the PDSMS, which enables to evaluate the diabetes self-efficacy perception with 8 items in a short time, is valid and reliable in the Turkish population.

Material and methods

Design

This methodological study was designed as a two-phase study. Phase I included the translation of the English version of PDSMS into Turkish, and Phase II consisted of the psychometric testing of Turkish version of the perceived diabetes self-management scale (T-PDSMS). The data of the study were collected through direct observations and informal interviews using Demographic Information Questionnaire, PDSMS, HBMS, and DSES.

Setting and sample

The population of this study consisted of the individuals admitted to the Diabetes Outpatient Clinic of a Faculty of Medicine. People having type-2 diabetes who consented to voluntarily participate in the study, who had no physical or psychiatric barriers to communication, who are primary school graduates at least, and who were aged 20-79 years or over were included in the study. Ultimately, 263 people with type-2 diabetes were included in the study. The test-pretest study was conducted by calling the same 40 patients by telephone after 2 weeks. These 40 patients also completed the other scales.

Bracken and Barona (1991)'s technique was used in translating the scale (20). This method (Figure 1) was used in the studies on cross-cultural adaptation of measurement tools to Turkey. It was first translated from English into Turkish by two people who have an excellent command of English and Turkish.

Translation process

The original PDSMS translated English to Turkish by two translators and combined into one after consensus.

↓

Turkish PDSMS in step 1 translated back to English
by four translators and combined into one after consensus.

↓

Committee discussions with the original scale developers
to develop the pre-final T-PDSMS.

↓

Ten patients with type 2 diabetes completed
the pre-final T-PDSMS.

Figure 1: *Flow Chart Describing The Development of The Turkish Version of The PDSMS*

Content validity procedure

The T-PDSMS form of the scale was revised with the opinions of expert panel members consisting of 16 diabetes professionals. The diabetes specialists were asked to evaluate the linguistic suitability (whether it is relevant, clear, and comprehensive) of all the scale items on a rating scale of 1-4 according to Davis (1992) technique. ((1 point: unsuitable, 2 points: partially suitable/item needs to be corrected, 3 points: suitable/but minor corrections need to be done, 4 points: absolutely suitable)) In this technique, the item-related "content validity index" is calculated by dividing the number of experts who selected " absolutely suitable " and " suitable/but minor corrections need to be done " by the total number of experts (21). A value of 0.80 is acceptable (22). Accordingly, it was expected that 80% of the items would receive 3 and 4 points (23). In line with the expert opinions and suggestions, the 2nd item of the PDSMS was modified to be adapted to Turkish and easily understood by Turkish patients. Subsequently, the questionnaire was translated back from Turkish to English by a language expert. The backtranslated and original forms of the PDSMS were then compared. After the scale was translated into Turkish, 10 individuals with type-2 diabetes were asked to fill in the T-PDSMS to test its equivalence.

Pretest study

In order to test whether the measurement items were understood by Turkish people with diabetes, a questionnaire was applied to 10 people with diabetes before the study. The questionnaires used in the pretest were not included in the study.

Data collection

After the T-PDSMS was prepared, data of the study was collected by the researchers. After about a two-week period from the 1st interview, the participants were called via phone by a researcher. The second interviews were carried out to check the T-PDSMS in terms of test-retest reliability.

Demographic information questionnaire

4 questions were asked to the participants to collect information about their gender, age, duration of diagnosis, and treatment modality. The duration of diagnosis was measured in years, and treatment modalities were categorized into three: (1) oral antidiabetic agent(s) alone, (2) insulin injection alone, and (3) both insulin injection and oral antidiabetic agent(s). In addition to this information, the fasting plasma glucose (FPG), PPG, glycosylated hemoglobin A1 (HbA1c), and body mass index (BMI) were measured (24). BMI was computed as the ratio of weight (kg) to the square of height (m) (25). FPG: The level of glucose in a venous blood sample collected after at least 10 hours of hunger. PPBG: The glucose level in the blood when measured 2 hours after a meal. Glycosylated hemoglobin HbA1c: The average of blood sugar in three months (24).

In the study, the diabetes-related health outcomes were determined as the period of diagnosis, BMI, FBG, PBG, and HbA1c. Analyses were conducted in a laboratory affiliated to Diabetes and Endocrinology Outpatient Clinic of Istanbul University Medical Faculty.

The Perceived Diabetes Self-Management Scale (PDSMS)

PDSMS was designed by Wallston through the modification of the Perceived Competence Health Scale (PHCS) (26). This scale could easily be adapted for a disease-specific self-management. PDSMS has 8 items and is evaluated with a 5-point Likert type scale where "strongly disagree" corresponds to 1 point, "disagree" to 2 points, "neutral" to 3 points, "agree" to 4 points, and "strongly agree" to 5 points. Four items of the scale were negative questions. Therefore, these 4 items were reverse scored. PDSMS scores range between 8 and 40, and the higher the score, the more the confidence in one's diabetes self-management (5).

In this study, it was aimed to evaluate the criterion-related validity of the PDSMS using other scales (concurrent validity) and diabetes outcomes (predictive validity). Therefore, DSES and HBMS, which represent self-care management behaviors in diabetes, were used. These scales have been adapted to the Turkish population (17,18).

Self-Efficacy

Jaap van der Bijl et al. developed DSES for people with type-II diabetes and administered it to Dutch and British populations. DSES was adapted to Turkish by Kara et al. (2006) and its validity and reliability were confirmed. The scale consists of 20 items. The response categories of the DSES items include "No, I'm not sure" (1), "no" (2), "Neither yes nor no" (3), "Yes" (4), and "Yes, I'm sure" (5). Each item receives a score ranging from 1 to 5. In the factor analysis, a total of 3 dimensions were found: diet and foot control (12 items), medical treatment (5 items), and physical exercise (3 items). The scale consists of 20 items and does not include any negative items. A minimum of 20 and a maximum of 100 points can be obtained from the total scale (17,27,28).

Health Belief Model

HBMS was adapted for people with type-II diabetes by Tan (2004).

HBMS was then adapted to Turkish by Kartal & Altuğ-Özsoy in 2007. It has 5 components: sensitivity perception (4 items), seriousness/caring perception (3 items), benefit perception (7 items), barrier perception (9 items), and health motivation (10 items). HBMS is a 5-point Likert scale consisting of 33 items. 12 items were reverse scored in this scale. Thus, a minimum of 33 and a maximum of 165 points can be obtained from the total scale (18,29). Kartal and Altuğ-Özsoy (2007) carried out the reliability and validity study of this scale.

Data analysis

All the data were entered and checked twice. To analyze data, SPSS 16.0 and LISREL 8.50 programs were used (30,31). Descriptive statistics were used to analyze the demographical information. Cronbach's alpha coefficient was used to check the internal consistency reliability of PDSMS. Exploratory and confirmatory factor analyses were conducted to test its construct validity. In order to test the criterion-related validity of the scale, Spearman correlations were calculated. Relevant diabetes outcomes such as period of diagnosis, BMI, FBG, PBG, and HbA1c were used in order to evaluate the predictive validity of the scale.

Ethical considerations

Primarily, the necessary permission was obtained from Kenneth A. Wallston to use PDSMS in this Turkish adaptation study. DSES and HBMS were used to establish the criterion related to the validation of the scale. We received permissions from Magfiret Kara for using DSES and Asiye Kartal for using HBMS. The required ethics approvals were obtained from the Ethics Committee of the Medical Faculty (IRB number: 08/1331). The purpose of the research was explained to the participants and their written consents were received. The study was carried out in line with the confidentiality precautions stipulated in Helsinki Declaration.

Table 1: Sociodemographic and clinical characteristics of the participants (n=263).

Characteristics	Mean±SD or n (%)
Age (years).	55.8 (± 7.3)
Gender	
Male	83(31.6)
Female	180 (68.4)
Duration of diabetes diagnosis (years)	10.9 (±6.8)
Treatment modality	
Oral antidiabetic medicine alone	130 (52.2)
Insulin alone	35 (14.1)
Both oral antidiabetic medicine and insulin	84 (33.7)
FPG	157.8 (57.9)
PPG	193.8 (64.8)
HbA1c	7.9 (4.2)
BMI	30.0 (±5.1)

Results

Descriptive statistics for T-PDSMS

The mean age of the diabetic people was 55.8 years (SD:7.3) and 68.4% of the participants were female. The participants had been having type-2 diabetes for 10.9 years (SD:6.8) and

most of the participants (52.2%) were using oral antidiabetic medicines (Table 1).

Content validity

All the items received 3 or 4 points. The mean relevance at the item level was 3.60. CVI is accepted as 0.80 when the majority of scale items are scored 3 and 4 points (22). Minor revisions were recommended for the item 2 by the experts ("I find efforts to change things I don't like about my diabetes are ineffective" was modified as "I do not believe in the necessity for changes that I must do in my disease"). This item was changed based on the expert panel's recommendations since it was not appropriate for the Turkish culture.

Reliability

Test-retest reliability

Fifteen percent of the participants accepted to fill in the scale on telephone for the 2nd time after 2 weeks. As a result of the two-week test–retest reliability, the general intra-class correlation coefficient was found to be 0.89 ($p< 0.001$) (95% CI; 0.80- 0.94).

Internal consistency reliability

Cronbach's alpha coefficients were analyzed to test whether the items in the scale were homogeneous. As a result, one item (item 2) was found to have a correlation coefficient below 0.30 (Table 2). Therefore, this item was removed from the scale. The rest of the items in the scale had significant correlations (0.70–0.77) within acceptable limits (Table 2).

Construct validity

Confirmatory factor analysis was carried out to test the construct validity of the scale by structural equation modeling (32).

Exploratory factor analysis

Sample size was found to be suitable for factor analysis (32,33) according to the Kaiser-Meyer-Olkin value (KMO=0.785) and the data was found to be suitable according to the Barlett test ($p<0.001$). Table 3 shows the results of the exploratory factor analysis. Two factors of the T-PDSMS with an eigenvalue of >1.00 were excluded from the analysis. The Factor 1 consisted of five items with factor loadings of >0.30, and it explained 24.71% of the variance. The Factor 2 consisted of two items, which accounted for 23.25% of the

variance. In general, these two factors explained 47.96% of the total variance (Table 3).

Confirmatory factor analysis

Confirmatory factor analysis was carried out using the structural equation modeling based on the results of the exploratory factor analysis. Construct validity was determined using Robust Maximum Likelihood method (30, 32). Two items (Q3–Q4) were significantly caused by the dimension "maintaining behavior" ($p< 0.01$), and the responses to five items, that is, Q1, Q5, Q6,Q7, and Q8 were also significantly caused the dimension "managing diabetes" ($p < 0.01$). In the study, χ 2/df (χ 2 divided by degree of freedom) value was used since it is less influenced by the sample. This value should be 2 or below (33,34). Root Mean Square Error of Approximation (RMSEA) is a measure for approximate fitness in the main sample. It ranges between zero and one (35). Goodness-of-Fit Index (GFI) indicates the extent to which the model can measure the covariance matrix in a given sample. GFI value ranges between 0 and 1. A GFI value greater than 0.90 refers to a good model (36). Comparative Fit Index (CFI) is the model that predicts that no relationship exists between the variables. It ranges between 0 and 1 (37). Standard Root Mean Square Residual (SRMR): The model has a better goodness of fit as this value approaches to 0 (38). The confirmatory factor analysis yielded good fitness indexes; the norm χ2 was 19.11, χ 2/df value was lower than 2, GFI was 0.95, CFI was 0.99, SRMR was 0.02, and RMSEA was 0.037. The GFI (0.95) was over 0.8, while RMSEA (0.037) and SRMR (0.02) were under 0.05 (34).

Criterion - related validity

Criterion validity is the degree of correlative association of an instrument with another instrument (concurrent validity) or another criterion of the same observable fact (predictive validity) (33).

Predictive validity

The correlations between the diabetes self-management scores and the parameters related to diabetes were examined (Table 4). A positive relationship was found to exist between diagnosis duration (r:0.10) and T-PDSMS scores ($p<0.001$), and a negative relationship

Table 3: Factor analysis of PDSMS.

	Factor 1		Factor 2	
	PDSMS 1	0.42	PDSMS 3	0.92
	PDSMS 5	0.57	PDSMS 4	0.70
	PDSMS 6	0.53		
	PDSMS 7	0.45		
	PDSMS 8	0.77		
Eigenvalue		1.73		1.63
Variance		24.71		23.25

Table 2: PDSMS item-total correlations and Cronbach's alpha coefficients*

PDSMS Item Wording	Mean (SD)	Corrected item total correlation	Cronbach alpha in case the item is removed
1. It is difficult for me to find effective solutions for problems that occur with managing my diabetes.	3.14 (1.19)	0.38	0.77
2. I find efforts to change things I don't like about my diabetes are ineffective.**	3.88 (1.03)	0.27	0.77
3. I handle myself well with respect to my diabetes.	3.84 (0.85)	0.51	0.74
4. I am able to manage things related to my diabetes as well as most other people.	3.97 (0.77)	0.59	0.73
5. I succeed in the projects I undertake to manage my diabetes.	3.86 (0.83)	0.61	0.72
6. Typically, my plans for managing my diabetes don't work out well.	3.31(1.10)	0.44	0.75
7. No matter how hard I try, managing my diabetes doesn't turn out the way I would like.	3.34 (1.14)	0.38	0.77
8. I'm generally able to accomplish my goals with respect to managing diabetes.	3.46 (1.07)	0.65	0.70
			0.77

** T-PDSMS with 7 items correlations and Cronbach's Alpha Coefficients*

between BMI (r: -0.28), FPG (r: -0.29), PBG (r: -0.25), HbA1c (r: -0.34) values, and T-PDSMS scores (p<0.001).

Concurrent validity

The compliance between the scale scores and the DSES and HBMS scores were evaluated through correlations (Table 5). Positive significant relationships were found between T-PDSMS, DSES, and HBMS (p<0.001) (Table 5).

Discussion

The purpose of this study was to examine the psychometric characteristics of T_PDSMS by testing its reliability and construct, concurrent, and criterion-related validities. This study presented a cultural adaptation of T-PDSMS by following international methodological procedures. The results reached in this study confirmed the good psychometric characteristics of T-PDSMS which consists of 7 items.

The test-pretest method was used to determine the reliability of the scale, and its internal consistency was examined. Hooper et al. (2008) asserted that an intra-class correlation coefficient of >0.75 indicated an excellent reproducibility and the values from 0.40 to 0.74 meant a fair to good reproducibility. The test-pretest reliability of the scale was good.

According to Hooper et al. (2008), the item-total correlation coefficients of >0.30 and the Cronbach coefficients of >0.50 are good for the scale. Total item correlation coefficient (between 0.39 and 0.69) of 2nd item had a correlation coefficient of r= 0.27. In this study, the reliability of the T-PDSMS was found to be good. The Cronbach's alpha coefficient of the T-PDSMS was determined to be 0.77 after excluding the 2nd item. In their study, Wallston et al. (2007) reported that the item analysis carried out on all eight items of PDSMS yielded a Cronbach's alpha of 0.834, with the corrected item-total correlations within the range of 0.390-0.707 (5). Also in the present study, an item analysis was carried out on all eight items of PDSMS, and it yielded a Cronbach's alpha of 0.77, with the corrected item-total correlations within the range of 0.42-0.77. The results of this study demonstrated a high reliability for the instrument with a correlation of 0.89, showing a stability for the findings measured with an interval of 2 weeks.

The data for the adequacy of the sample (KMO), the appropriateness of the factor model eigenvalues, the factor loadings in the exploratory factor analysis, and the model fit indexes of the confirmatory factor analysis were within the statistical standards for all values (33,34). The scale has a two-dimensional structure both in the present study and the study conducted by Wallston et al. In the present study, two dimensions explained 47.9% of the total variance. Additionally, a factor should include at least 3 items (30). Therefore, likewise in the original scale, sub-group were not needed in this study. The factor loads obtained from confirmatory factor analysis provided sufficient evidence for the validity of all items since they had a sufficiently high load on the structures to which they corresponded. The confirmatory factor analysis revealed a good fit for the model with 7 items.

The model fit should be examined according to multiple indicators. Indexes of model fit, the chi-square to degrees of freedom ratio (χ^2/df) (34), CFI, RMSEA, GFI, and SRMR (38) were used in this study to examine the measurement models. The RMSEA values below 0.05 indicate a good fit (35). The models with a SRMR below 0.05 have a good fit (38). The CFI values above 0.90 indicate good model fit (37). The standardized SRMR values greater than 0.08 (38) are significant. Because χ2 was too sensitive to the increases in sample size and to the number of variables, the ratio of χ2 to its degree of freedom (χ2/df) was used, and the ratios less than 3 indicate an acceptable fit between the sample data and the hypothetical model (34). The confirmatory factor analysis yielded good fitness indexes; the norm χ2 was 19.11, χ 2/df value was lower than 2, GFI (0.95) was over 0.90, CFI (0.99) was over 0.90, SRMR (0.02) was under 0.08, and RMSEA

Table 4: Relationship of T- PDSMS and diabetes control.

		T – PDSMS
Period of diagnosis	r	0.10
	p	0.088
BMI	r	- 0.28
	p	0.000
FBG	r	- 0.29
	p	0.000
PBG	r	-0.25
	p	0.000
HbA1c	r	-0.34
	p	0.000

p< 0.001
r: Spearman's correlation coefficient
PDSMS with 7 items in the current study

Table 5: The relationship between HBMS, DSES, and PDSMS (n=263)

		HBMS Score	DSES Score	T-PDSMS Score
HBMS Score	r	1		
	p	.		
DSES Score	r	0.256	1	
	p	0.000	.	
T-PDSMS Score	r	0.226	0.530	1
	p	0.000	0.000	.

(0.037) was under 0.05. In the study in which the original scale was used, no confirmatory factor analysis was carried out (5).

In this study, the predictive validity of the scale was tested by examining the relationships between the scale score and the diabetes related parameters. As the diagnosis duration increases in diabetes, so does the self-management perception (T-PDSMS) score. Moreover, as expected, the BMI, FPG, PPG, and HbA1c values were found to be low in the people with high self-management perception scores. Patients feel more successful as their awareness about diet, exercise, blood glucose control, and accordance to medical suggestions increases (14,39). A positive effect on BMI, FPG, and HbA1c was also found in the study by Wallston et al. High levels of self efficacy also have a positive effect on the metabolic controls of people with diabetes. Many studies have been carried out on self-efficacy, health beliefs, and diabetes self-management (6,17,18). Self-efficacy and health belief of the diabetic individuals increase as they perceive themselves successful in diabetes self-management (17,39). The concurrent validity of the PDSMS was evaluated using HBMS, DSES, and PDSMS (17, 18,31). Likewise, in the study by Wallston et al., the subdimensions of the Diabetes Self Care Activities Scale (DSCAS) correlated with perceived diabetes self-management. Therefore, the concurrent validity of the Turkish version of the PDSMS was supported.

Determination of the perceived diabetes self-management is a key factor for diabetes health professionals in terms of planning patient education which aims to increase the patients' self-care activities and capability of fighting against diabetes (14). The success of patients in performing different aspects of diabetes self-care activities is evaluated using the instruments designed for measuring diabetes self-efficacy in the world and in the Turkish community (6,7,17,39). In the present study, the original PDSMS developed by Wallston et al. was questioned in terms of how an individual perceives oneself in the management of diabetes and motivation (5,39). This version of the PDSMS, unlike the others, will contribute to the care and education of people with diabetes.

Limitations of the study

In the analysis, it was found that one item (Item 2) had a low correlation coefficient. Translated versions of a scale might yield a reliability score lower than that of the original one. This may stem from the differences in cultural features. In addition, this study was carried out with the participation of the individuals with diabetes in a single region of Turkey. For this reason, the results cannot be generalized.

Conclusion and Recommendations

In conclusion, T-PDSMS, which consists of 7 items and one dimension, is a valid and reliable scale that is ready for clinical use by health professions. The effect of culture on the protective health behavior of people with diabetes can only be measured through measurement tools that are valid and reliable for that culture. As data revealed, a low level of self-efficacy causes the diabetes self-management to be poor. For the success of diabetes management, nurses should evaluate and improve the perceived self-management of the people with diabetes.

There is a need for further research on PDSMS to examine its stability in case there is no self-management interventions. Furthermore, the longitudinal use of PDSMS is important for the predictive validity of the scale. In this way, the change in the perceived diabetes competence over time can be understood better, as well as the relationship of this change to the change in self-care behaviors and diabetes outcome.

Conflict of interest

There are no potential conflicts of interest.

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