e-ISSN:2687-2145

BANDIRMA ONYEDİ EYLÜL ÜNİVERSİTESİ SAĞLIK BİLİMLERİ VE ARAŞTIRMALARI DERGİSİ
BANU Journal of Health Science and Research

DOI: 10.46413/boneyusbad.1509435 ***Özgün Araştırma / Original Research***

Mcgill Empowerment Assessment-Diabetes Questionnaire: Turkish Validity and Reliability Study

Mcgill Güçlendirmeyi Değerlendirme-Diyabet Anketi: Türkçe Geçerlik Güvenirlik Çalışması

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Geliş tarihi / Date of receipt: *18.07.2024*

Kabul tarihi / Date of acceptance: *09.02.2025*

Atıf / Citation: Bahçecioğlu Turan, G., Özer, Z., Başak, S. (2025). Mcgill empowerment assessment-diabetes questionnaire: Turkish validity and reliability study. *BANÜ Sağlık Bilimleri ve Araştırmaları Dergisi*, *7*(1), 126-137. doi: 10.46413/boneyusbad.1509435

ABSTRACT

Aim: *The present study aimed to examine the Turkish validity and reliability of the McGill Empowerment Assessment-Diabetes (MEA-D) Questionnaire in individuals with diabetes.*

Design: The present study was conducted in methodological design.

Material and Method: *This methodological study was conducted on 300 individuals diagnosed with diabetes. Personal information form and MEA-D were used to collect the data. Exploratory and confirmatory factor analysis, Cronbach's alpha, item-total score correlation, and test-retest analysis were used to evaluate the data collected.*

Results: *Factor loads of items were between 0.64-0.92. Fit index values were x^2/SD 1.90, CFI = 0.97, NFI = 0.92, IFI = 0.96, TLI = 0.95 RMSEA = 0.078, RMR = 0.07, and SRMR = 0.08. Sub-dimensions had Cronbach's Alpha values between 0.92 and 0.98, while total Cronbach's alpha value was 0.96. It was concluded that the Turkish version of the 28-item and 4 sub-dimension questionnaire was confirmed with no changes to the original form.*

Conclusion: *Turkish version of the MEA-D is a valid and reliable tool for evaluating the empowerment status of individuals diagnosed with diabetes and for being used in clinical settings.*

Keywords: *Validity, Reliability, Diabetes, Empowerment, Patient*

ÖZET

Amaç: *Bu araştırma, diyabetli bireylerde McGill Güçlendirmeyi Değerlendirme-Diyabet Anketi'nin (MEA-D) Türkçe geçerlik ve güvenirliğini incelemek amacıyla yapıldı.*

Gereç ve Yöntem: *Bu araştırma diyabet tanısı konulan 300 kişiyle yürütülen metodolojik bir çalışmadır. Veriler kişisel bilgi formu ve MEA-D kullanılarak toplandı. Veriler açıklayıcı ve doğrulayıcı faktör analizi, Cronbach Alfa, madde-toplam puan korelasyonu ve test-tekrar test analizi kullanılarak değerlendirildi.*

Bulgular: *Ölçek maddelerinin faktör yük değerlerinin 0.64-0.91 arasında değiştiği bulundu. Ölçekte uyum indeks değerleri x2/Sd 1.90, CFI = 0.97, NFI = 0.92, IFI = 0.96, TLI = 0.95 RMSEA = 0.078, RMR = 0,07 ve SRMR = 0.08 olarak bulundu. Ölçeğin alt boyutlarının Cronbach's alpha değerinin 0.92- 0.98 arasında değiştiği toplam Cronbach's alpha değerinin ise 0.96 olduğu belirlendi. 28 maddeli ve 4 alt boyutlu ölçeğin Türkçe formunun orijinal ölçek formunda hiçbir değişiklik olmadan doğrulandığı görüldü.*

Sonuç: *MEA-D'nin Türkçe versiyonu, diyabet tanısı konulan kişilerin güçlenme durumlarının değerlendirilmesi ve klinik uygulamalarda kullanılması için geçerli ve güvenilir bir ölçme aracıdır.*

Anahtar Kelimeler: *Geçerlilik, Güvenilirlik, Diyabet, Güçlendirme, Hasta*

INTRODUCTION

As one of the most common illnesses in the world, the burden (Lin et al., 2020) and prevalence of Diabetes Mellitus (DM) has been increasing over the past decade (Saeedi et al., 2019). In 2019, the global prevalence of diabetes was 9.3% (463 million people). It is anticipated that this number will increase to 10.2% (578 million) in 2030 and 10.9% (700 million) in 2045 if effective prevention programs are not adopted (Saeedi et al., 2019). Genetic (multiple gene involvement) and environmental factors (stress, aging, obesity, overeating, lack of exercise) cause Type 2 diabetes mellitus (T2DM), which is the type seen in 90-95% of all diabetes cases (World Health Organization [WHO], 2023). Poor medication adherence, insufficient knowledge of diabetes, and poor self-care behaviours can increase blood sugar levels (Nazir, Hassali, Saleem, Bashir, & Aljadhey, 2016). Combined with consistent efforts to improve health behaviors (nutrition, activity, sleep, and self-monitoring) and to provide diabetes self-management education and support, these form the foundation of diabetes management. In this context, acceptance of, adherence to, and persistence with medical and behavioral interventions to support cardiorenal health, cardiovascular risk reduction, and attainment of glycemic and weight goals will prevent complications and optimize quality of life (Davies et al., 2022).

Individual-centred care means considering patients as a whole, respecting their autonomy, and their values, and including their preferences, emotional states and special conditions in decision-making about their health (Zill, Scholl, Härter, & Dirmaier, 2015). The aim of individual-centred care is to increase the power of patients to manage their illness actively and successfully (Duarte-Díaz et al., 2022). Empowerment is an increase in one's own abilities and regaining control to shape one's life (Bartle, Couchonnal, Canda, & Staker, 2002). Patient empowerment is a process through which healthcare professionals aim to help patients to make their own health decisions by enabling them to think critically and act autonomously (Anderson & Funnell, 2010). Patient empowerment is important for managing the treatment process more effectively and using resources efficiently and effectively. Empowerment requires a fundamental shift from a disease-focused approach to a patient- and family-focused approach to illnesses that require long-term care. This allows patients to be empowered and involved at all levels in the healthcare system. This allows the care services to be designed together to meet the needs of patients more effectively (European Patients Forum, 2015).

Empowerment in diabetes care can be defined as "helping individuals to uncover and use their innate ability to acquire mastery over DM" (Funnel et al.,1991). It has been stated that when patients have the self-awareness, knowledge, skills and attitudes to affect the behaviour of others and their self-behaviour to improve their quality of life, they can be considered to have empowerment (Funnell et al., 1991). A comprehensive and reliable tool to measure empowerment that will help patients with DM manage their condition better will enable to assess the needs of patients and to evaluate and develop programs designed with patients in mind (Gagnon et al., 2020).

A tool is used to measure empowerment in individuals with diabetes: "Diabetes Empowerment Scale (DES). DES (37 items)" and "Diabetes Empowerment Scale-Short Form (DES-SF; 28 items)" are tools translated into many languages. In conceptual terms, these scales address only psychosocial self-efficacy related with diabetes (Anderson, Funnell, Fitzgerald, & Marrero, 2000). Considering the lack of tools that measure empowerment in individuals with DM, a more comprehensive measurement tool is required to provide a broader range of assessments about DM empowerment. "The McGill Empowerment Assessment-Diabetes (MEA-D)" is a self-report questionnaire measuring the empowerment of individuals with DM who participate in community programs. It is used to find out individuals' needs for empowerment and then develop interventions to specifically address those needs. In addition, after participating in a health intervention that aims empowerment, patients can see the changes in empowerment (Gagnon et al., 2020). This study was designed to adapt the "McGill Empowerment Assessment-Diabetes" developed by Gagnon et al. (2020) into Turkish through testing its validity and reliability.

MATERIAL AND METHODS

Research Type

The present study was conducted with the methodological design.

Study Population and Sample

Patients who have diabetes (type-1 and type-2) admitted to the Internal Medicine Clinics of a state university hospital between February and September 2022 constituted the population of the study. 300 volunteering patients with diabetes meeting the criteria for inclusion in the study (being 18 years old or over, having diabetes for at least 3 months, not having a psychiatric problem and being able to communicate adequately) participated in the study between the specified dates. The sample size of scale adaptation studies must be at least 5 times (if possible 10 times) the number of scale items (Noh, 2019; Prinsen et al., 2018; Tabachnick, Fidell, & Ullman, 2019). The original MEA-D has 28 items. Therefore, the sample size must be at least 140 or 280. As a result, the study was terminated with 300 volunteering diabetic patients who met the criteria to be included in the study.

Data Collection Tools

Data collection took place face-to-face with "Personal Information Form" and "McGill Empowerment Assessment-Diabetes (MEA-D) Questionnaire."

Personal Information Form: Nine questions on age, gender, marital status, educational status, employment status, income status, years since the diagnosis of disease, presence of chronic comorbidities and level of information about the disease were included in this form.

McGill Empowerment Assessment-Diabetes (MEA-D): This measurement tool was developed by Gagnon et al. in 2020 with the aim of evaluating empowerment status of patients with diabetes (Gagnon et al., 2020). There are 28 items in the 5 Likert-type scale. The responses are "strongly disagree (1)", "disagree (2)", "undecided (3)", "agree (4), strongly agree" (5). The scale has 4 sub-dimensions. The sub-dimensions are "Attitude" (items 1-10); "Information" (items 11-16); "Skill (items 17-21)" and "Relationship" (items 22-28). Sub-scale scores are found with the sum of scores obtained from the items in each subscale. Higher scores on the scale mean better empowerment status of patients with diabetes (Gagnon et al., 2020).

Translation Process

In order to adapt a scale into another language, at least two foreign language experts must translate the scale. Following the translation, at least two language experts in the target language must review the suitability of the translated scale. Field experts must check the suitability of the items to the field and revisions must be made if necessary (Seçer, 2020). Following the creation of the form in the target language, the form must be translated back into the original language. After the process of translation and back translation are completed, the two forms must be compared by experts who are fluent in both languages (Seçer, 2020). In the present study, three independent foreign language experts first translated the scale into Turkish. Next, the expressions were put in a single form and 3 Turkish Language experts, 1 Scale Development Specialist and 6 experts (one public health specialist, one psychiatry and four internal medicine nursing specialists) reviewed this form. Suitability of the items, Turkish language validity and cultural compatibility were checked and revisions were made. In the next stage, a single form was prepared from the expressions and a foreign language expert translated the scale back into the original language. The two resulting forms were compared, and it was found that the Turkish form was similar to original form. Content validity index (CVI) was performed for checking the linguistic-cultural equivalence of the items and content validity with numerical values. In terms of content, language and cultural equivalence, CVI is the most widely preferred method among nurse researchers. In the literature, a CVI analysis >0.80 indicates adequacy in terms of content validity (Polit & Beck, 2006).

Pre-application

A pilot implementation was performed on 30 (15 type 1 diabetes and 15 type two diabetes) patients with diabetes for testing the comprehensibility of scale items. These 30 patients were not included in the sample. Participants filled out the scale and evaluated each item for comprehensibility. During the pilot application, the items were not changed. With this information, the actual implementation was started.

Main application

In the study, first the consent of participants was obtained for the questionnaire. Afterwards, the participants were given and asked to fill in the questionnaires. The questionnaires of illiterate participants were filled in by the researcher. Three hundred participants were reached.

Ethical Consideration

Ethics Committee of a University (Date: 16.12.2021 and Approvel Number: 2021/13- 36)

approved the study and the hospital where the research would be conducted provided institutional permission. The scale owner gave an official permission via e-mail for the adaptation of "MEA-D" questionnaire into Turkish. The study followed the Helsinki Declaration of Human Rights. The purpose of the study was explained to the participants and verbal consent was taken from each.

Statistical Analysis

SPSS 25 and LISREL 8.8 programs were used to analyse the data. Sociodemographic data of the participants were shown with arithmetic mean, standard deviation, frequency and percentage. The data are considered to be suitable for factor analysis with a significant Bartlett's Test of Sphericity and a KMO of >0.60 (Tabachnick, Fidell, & Ullman, 2007). In EFA, principal component analysis, one of the factorization techniques to extract the maximum variance with each component in the dataset, and Varimax rotation technique (Seçer, 2020; Çokluk & Büyüköztürk 2021), the most widely used method based on the assumption that the factors are unrelated to obtain more information about the measured structure or to interpret the results more clearly, were used. While determining the factors, the view that the eigenvalue must be >1 and the item factor loads must be ≥ 0.30 was taken into account (Kim, 2016; Seçer, 2020). CFA was carried out with LISREL 8.8 to verify the scale structure shown by EFA. Average variance extracted (AVE) and composite reliability (CR) were evaluated for convergent validity (Cheung, Cooper-Thomas, Lau, & Wang, 2023). CR>AVE; AVE>0.5 was taken into account in convergent validity (Yaşlıoğlu, 2017). For scale reliability, Cronbach's Alpha internal consistency coefficient and CR values > 0.70 were taken into account (Hair, Black, Babin, & Anderson, 2014). In the test-retest analysis performed to test the stability of the scale, a significant correlation value close to 1 between the structures measured at different times indicates stability (Gagnon et al., 2020; DeVellis & Thorpe, 2021).

RESULTS

Participants' mean age was 52.18 ± 18.03. It was found that 53.3% were male, 77.7% were married, 28% were primary school graduates, 68.3% were unemployed and the income of 61.3% was equal to their expenses. In addition, 79.3% of the participants had type 2 diabetes, 38.3% had a diagnosis for 10 years or more, 59.7% did not have any other chronic illnesses, and 57.3% had insufficient information about the disease (Table 1).

Table 1. Descriptive Characteristics of the Patients

Characteristics	Number (n=300)	%
Gender		
Female	140	46.7
Male	160	53.3
Marital status		
Married	233	77.7
Single	67	22.3
Educational status		
Illiterate	32	10.7
Literate	17	5.7
Primary education	84	28
Secondary education	55	18.3
High school	72	24
University and higher	40	13.3
Employment status		
Employed	95	31.7
Unemployed	205	68.3
Income status		
Income<expense	109	36.3
Income=expense	184	61.3
Income>expense	7	2.3
Diabetes type		
Type 1 diabetes	62	20.7
Type 2 diabetes	238	79.3
Years since diagnosis		
3-12 months	56	18.7
1-5 years	75	25
5- 10 years	54	18
≥10 years	115	38.3
Presence of other chronic comorbidities	121	40.3
Yes	179	59.7
No		
Level of information about the disease	128	42.7
Sufficient	172	57.3
Insufficient		
	Mean±SD	**Min-Max**
Age (yrs.)	52.18 ± 18.03	18-92

Results regarding validity

Content Validity

"Item-based content validity index (I-CVI)" in the Turkish version draft of the scale based on the views of six experts were between 0.90 and 1.00, and scale-based content validity index (S-CVI) was 0.96.

Construct validity

Prior to the construct validity, sample size suitability and dataset analysis suitability were tested with KMO and Bartlett's Test of Sphericity. KMO value was 0.937 and Bartlett's Sphericity Test was significant (x^2= 6790.782; p=0.000; Table 2).

Table 2. Results of The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity

Tests		**Test Results**	
KMO		0.937	
Bartlett Sphericity Test	**Chi-square**	6790.782	p < 0.001
	SD	378	
	P	0.000	

Exploratory Factor Analysis

Factor structure of the scale was assessed with two of the most common factor analysis statistical techniques, Principal Component Analysis and Varimax rotation method. In the explanatory factor analysis, 4 dimensions were found similar to the original structure, explaining 83.70% of the total variance (Table 3). All items had factor loads between 0.64 and 0.92 (Table 3). The values found were indicative of 4 sub-dimensions with 28 items.

Table 3. Item-Total Score Correlation Coefficients, Factor Loads and Explained MEA-D Variance Results

Scale Items	Corrected Item-total Correlations	Cronbach's Alpha if Item Deleted	**Mean (SD)**	**Factor Load**			
				F1	F2	F3	F4
Item1	0.822	0.963	3.54 ± 0.84	0.818			
Item2	0.804	0.963	3.6 ± 0.73	0.813			
Item3	0.872	0.962	3.56 ± 0.84	0.828			
Item4	0.715	0.964	3.94 ± 0.92	0.829			
Item5	0.850	0.963	3.50 ± 0.87	0.845			
Item6	0.881	0.962	3.54 ± 0.84	0.854			
Item7	0.886	0.962	3.52 ± 0.85	0.841			
Item8	0.896	0.962	3.58 ± 0.82	0.797			
Item9	0.833	0.963	3.66 ± 0.75	0.812			
Item10	0.781	0.963	3.78 ± 0.74	0.800			
Item11	0.793	0.963	3.60 ± 0.92		0.792		
Item12	0.721	0.964	3.89 ± 0.89		0.777		
Item13	0.815	0.963	3.63 ± 0.83		0.821		
Item14	0.810	0.963	3.68 ± 0.76		0.815		
Item15	0.812	0.963	3.59 ± 0.82		0.820		
Item16	0.828	0.963	3.68 ± 0.82		0.815		
Item17	0.342	0.967	3.02 ± 1.07			0.642	
Item18	0.378	0.967	2.75 ± 1.02			0.893	
Item19	0.578	0.965	2.36 ± 1.05			0.916	
Item20	0.586	0.965	2.34 ± 1.04			0.920	
Item21	0.564	0.965	2.34 ± 1.03			0.897	
Item22	0.540	0.965	3.85 ± 0.59				0.813
Item23	0.567	0.965	3.84 ± 0.58				0.862
Item24	0.620	0.964	3.80 ± 0.61				0.884
Item25	0.553	0.965	3.94 ± 0.53				0.836
Item26	0.724	0.963	3.66 ± 0.83				0.740
Item27	0.693	0.964	3.69 ± 0.81				0.790
Item28	0.554	0.965	3.46 ± 0.96				0.683
Eigenvalue				80.53	50.46	50.29	40.13
Explained variance % Total =83.702				30.49	19.51	18.91	14.77

Confirmatory Factor Analysis

Different datasets were employed for EFA and CFA through randomly splitting the dataset into two (Orçan, 2018). Thus, CFA was carried out with 150 participants. Table 4 shows the fit indices found with CFA. Figure 1 presents the PATH diagram resulting from confirmatory factor analysis.

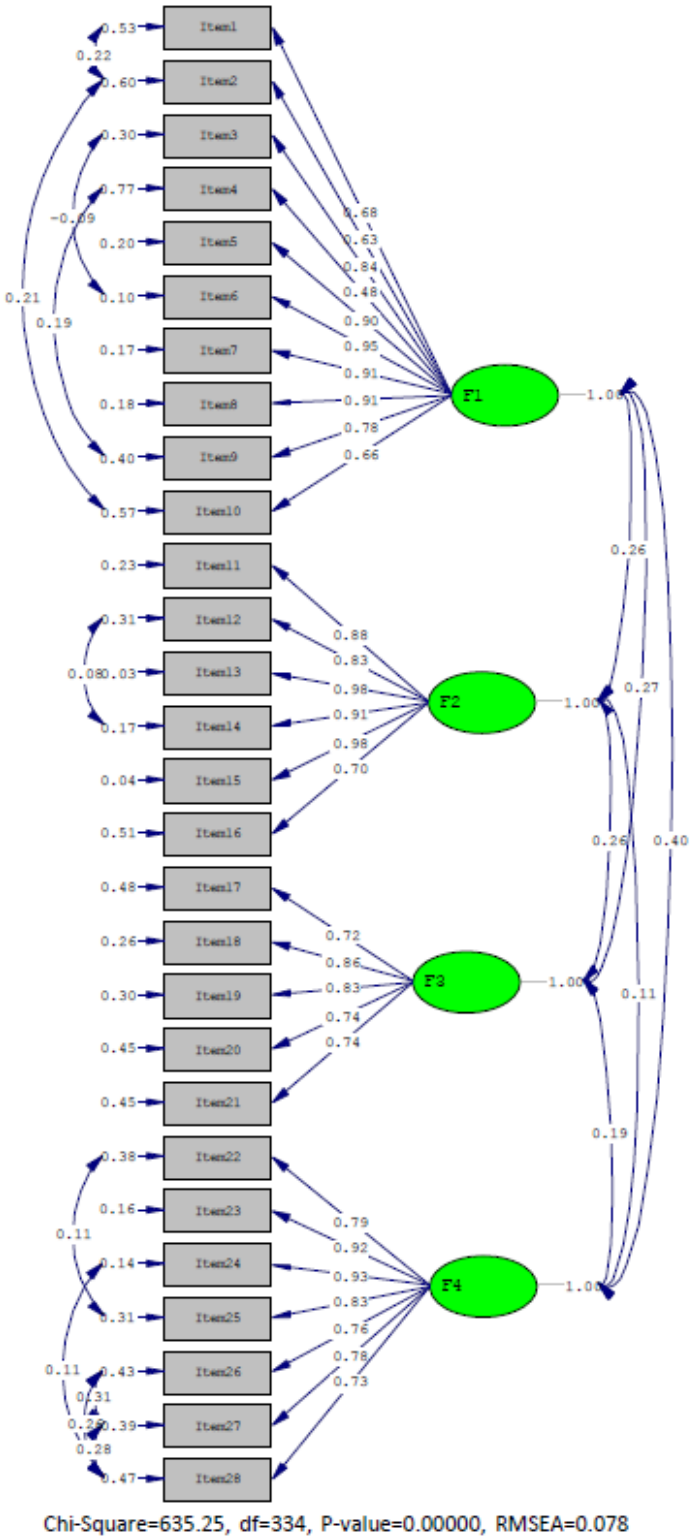

Figure 1. PATH Diagram of the Factor Structure

Convergent validity

In this study, for "F1" sub-dimension, AVE was 0.56 and CR was 0.87; for "F2" sub-dimension, AVE was 0.78 and CR was 0.95; for "F3" sub-dimension, AVE was 0.60 and CR was 0.88, and for "F4" sub-dimension, AVE was 0.67 and CR was 0.93 (Table 4).

Table 4. CFA Results

Fit criteria	Found	Appropriate	Acceptable	Result
x^2/df (**CMIN/DF**)	1.90	<2	<5	Appropriate fit
RMSEA	0.078	<0.05	<0.08	Acceptable fit
CFI	0.96	>0.95	>0.90	Appropriate fit
NFI	0.92	>0.95	>0.90	Acceptable fit
IFI	0.96	>0.95	>0.90	Appropriate fit
RMR	0.07	<0.05	<0.08	Acceptable fit
SRMR	0.08	<0.05	<0.1	Acceptable fit
TLI	0.95	>0.95	>0.90	Acceptable fit

CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation; RMR: Root Mean Square Residual; NFI: Normed Fit Index; IFI: Incremental Fit Index; TLI: Tucker Lewis Index; SRMR: Standardized Root Mean Square Residual; x^2/df (CMIN/DF): Chi-square/Degree of freedom.

Results regarding reliability

Cronbach Alpha coefficients were found for the reliability analyses of the resulting 28 items. Cronbach Alpha coefficient was 0.98 for "F1" sub-dimension, 0.97 for "F2" sub-dimension, 0.92 for "F3" sub-dimension, and 0.93 for "F4" sub-dimension. Cronbach Alpha value of the overall scale was 0.96 (Table 5). Values between 0.342 and 0.896 were found as total item-total correlation coefficients of the scale (Table 2).

No statistically significant differences were detected between the two measurements conducted two weeks apart ($p > 0.01$). The test-retest reliability coefficients were statistically significant in evaluating the relationship between two applications ($p < 0.001$) (Table 5).

Table 5. Correlation between factors, mean scores, reliability and convergent validity results

Factors		X ± SD	t/P	Test-retest (r*)	α	Min-Max	X±SD	AVE	CR
F1	Pretest	36.32 ± 9.32	t=-1.567 p=0.125	r=0.985 p<0.001	0.98	13-50	36.32 ± 7.66	0.56	0.87
	Posttest	36.72 ± 9.20							
F2	Pretest	22.25 ± 5.84	t=-1.812 p=0.078	r=0.968 p<0.001	0.97	6-30	22.08 ± 4.82	0.78	0.95
	Posttest	22.67 ±5 .51							
F3	Pretest	13.35 ± 5.53	t=0.141 p=0.889	r=.979 p<0.001	0.92	5-25	12.82 ± 4.61	0.60	0.88
	Posttest	13.32 ± 5.51							
F4	Pretest	27.00 ± 4.62	t=-1.549 p=0.129	r=0.950 p<0.001	0.93	7-37	26.26 ± 4.24	0.67	0.93
	Posttest	27.37 ± 4.90							
MEA-D	Pretest	98.92 ± 1.03	t=-1.783 p=0.082	r=0.980 p<0.001	0.96	31-140	97.49 ± 17.09	-	-
	Posttest	100.10 ± 20.80							

a= Cronbach Alpha Coefficient; AVE: Average Variance Extracted, CR: Construct Reliability; X: Mean; SD: Standard deviation; p<.001; r=Pearson Correlation Coefficient; t= Paired sample t test

DISCUSSION

Although there are a few studies evaluating the empowerment states of patients with diabetes in Turkey (Jahanpeyma, Karaman, Yildirim, Sahin, & Aykar, 2020; Özcan, 2012), a more comprehensive measurement tool evaluating the empowerment situation in a wide range has not been found. Therefore, Turkish validity and reliability study of the McGill Empowerment Assessment-Diabetes Questionnaire was conducted. The results found are discussed below.

CVI is extensively used by researchers for determining the content validity. CVI is the most widely used index in quantitative evaluation. There are 2 kinds of CVI: I-CVI and S-CVI (Polit & Beck, 2006). I-CVI and S-CVI values of >0.80 indicate agreement between views of the experts (Polit et al., 2007; Seçer, 2020). The result that I-CVI and S-CVI values were >0.80 in this study show agreement between experts and also indicate that the topics are adequately measured.

Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) tests are the two main methods used to establish whether data are fit for factor analysis. By quantifying sampling adequacy, both tests aim to ascertain the factorability of the data set or matrix (Johnson and Wichern, 2007). Bartlett Sphericity test and KMO analysis evaluate the suitability and adequacy of data for factor analysis. For factor analysis, Bartlett Sphericity test result must be statistically significant and KMO value must be ≥0.60 (Boateng, Neilands, Frongillo, Melgar-Quiñonez, & Young, 2018). KMO value was 0.937, and Bartlett's Test of Sphericity analysis showed that X2 value was 6790.782; p<0.001 in the present study. In this context, it can be seen that the database and the number of individuals participating in the research are sufficient for factor analysis. As a result of the EFA, a 4-factor (sub-dimensional) structure with an eigenvalue >1 was found for 28 items. Total explained variance was found to be 83.70%. Explained variance ratio must be above 40% in multidimensional scales for a good construct validity. Higher explained variance indicates stronger construct validity (Boateng et al., 2018; Finch, 2019). In line with these results, the high explained variance in this study shows that the related concept or structure is measured better.

To support the deletion or modification of items is the estimation of inter-item and item-total correlations. These correlations often displayed in the form of a matrix are used to examine relationships that exist between individual items in a pool. Inter-item correlations examines the extent to which scores on one item are related to scores on all other items in a scale. Also, it examines the extent to which items on a scale are assessing the same content (Boateng et al., 2018). Studies recommend that a scale must have a factor load of ≥0.30, and items <0.30 must not be included the scale (Finch, 2019; Seçer, 2020). Four sub-dimensions were found and factor load values were between 0.64 and 0.91 in the present study. Since no items had a factor load of <0.30, no item was deleted from the scale. All these results show that the construct validity factor structure in the study is strong. No comparison could be made since the original scale study did not include factor loads.

There are basically two applications within the scope of factor analysis. The first of these is the EFA, which aims to reveal and discover the factor structure underlying the expressions representing the variables of a scale that has been newly created or translated from one language to another; the other is the CFA, which is used to check whether a previously used scale conforms to the original factor structure when used in the current research, and if so, to what extent it conforms (Yaşlıoğlu, 2017). Most studies in this field suggest that the structure shown by EFA must be examined with CFA (Xia & Yang, 2019). X^2/df, RMSEA, CFI, NFI, IFI, TLI, RMR and SRMR fit index values were found as a result of CFA. In the literature, x2/df <2, RMSEA ≤0.80, CFI, NFI, IFI, and TLI indices > 0.90, RMR < 0.08, and SRMR< 0.1 are considered as an indicator of good fit (Alavi et al., 2020; Kline, 2016; Seçer, 2020; Xia & Yang, 2019). CFA results were in accordance with the criteria specified in literature in the present study. However, a comparison could not be made s since the original scale study did not include did not present the CFA results. When examined from a holistic perspective, the results obtained from the study show that the model fit of the 28-item 4 sub-dimension model is acceptable with no changes to the original scale form and some values show appropriate fit. All the results in the study are indicative of high validity for the scale in Turkish culture.

In the reliability analysis, firstly, internal consistency was evaluated. Internal consistency is evidence that all factors in the scale show the same structure and measure the same feature.

Cronbach's alpha coefficient is an internal consistency reliability measure that is frequently used to find out the consistency of scale items with each other (Bolarinwa, 2015). It is stated that Cronbach's alpha coefficient allows the calculation of reliability of measurements that include more than one component. The word component in this expression can mean an item, half of a test, or a subtest. Multiple components can measure a single latent variable, or they can measure more than one latent variable/factor. These features increase the use of Cronbach's alpha coefficient (Kula Kartal & Mor Dirlik, 2016). It is recommended in literature for this value to be between 0.60 and 1.00 (Kılıç, 2016). In this study, Cronbach's alpha values of the total scale and sub-dimensions of the scale were found to be >0.90. Cronbach's alpha values were >0.70 in the original scale (Gagnon et al., 2020). With these results, it can be said that the scale is similar to the original structure with a strong internal consistency.

Convergent validity, which is one of the methods of determining the scale validity. Convergent validity refers to convergence across one or more methods. Traditionally, the issue concerns the extent to which two or more scales (sets of items) correlate across method, but may also refer to convergence within scales. In structural equation modeling, observable items load on a latent factor or variable (the construct) (Spangler, Gupta, Kim, & Nazarian, 2012). It is evaluated with AVE and CR (Cheung el al., 2023). The results of AVE>0.50, CR>0.80, and CR>AVE must be met to establish convergent validity. When these values are provided, it means that the reliability is good. (Yaşlıoğlu, 2017). In this study, convergent validity values were found to be similar to the values suggested in the literature. Since AVE values and CR values were not shown in the original study, it was not possible to make a comparison.

To prove that the items measure the variable questioned, item-total score analysis is recommended. The relationships among the scores and the total score is explained in this way (Johnson & Christensen, 2019). Acceptable value is >0.20, while it is expected to be as close as possible to 1 and positive (Johnson & Christensen, 2019). The values were >0.20 in the present study and there was a positive relationship. Similar results were found in the original scale study (Gagnon et al., 2020).

Test-retest reliability measures the stability of the scores of a stable construct obtained from the same person on two or more separate occasions. Reliability concerns the degree to which scores can be distinguished from each other, despite measurement error. In the case of test-retest assessment, intraindividual response variability is used to estimate measurement error (Vilagut, 2014). Test-retest method measures consistency and it is recommended that the measurement results of two applications must not be statistically significant (Noble, Scheinost, & Constable, 2019). No statistically significant differences were detected in the present study between the mean scores when the "t-test for dependent groups" was carried out to evaluate the presence of a statistically significant difference between the mean measurement results of the two applications with 2 weeks apart ($p > 0.01$). Test-retest reliability coefficients were statistically significant ($p< 0.001$). Same results in both evaluations show that the statements are clear and consistent.

Empowerment is a process whereby an individual has greater ability to determine their decisions and self-care activities for their health (Lambrinou, Hansen, & Beulens, 2019). To help people with diabetes better manage their conditions, having a comprehensive and reliable measure of empowerment would better enable assessment of their needs and assessment and improvement of programs designed with them in mind (Gagnon et al., 2020). Health measurement scales are important tools in evaluating an individuals characteristics that cannot be measured directly. During the past years health scales have become firmly established as a routine part of evaluating interventions and in planning health care (Panagiotakos, 2009). MEA-D is intended to be used to identify empowerment-related needs of individuals and then to be able to develop and tailor interventions to specifically address these needs. This scale can be evaluated as a measure of change in empowerment after participation in a health intervention targeting empowerment (Gagnon et al., 2020). There are not many scales in Turkish regarding diabetes empowerment. A more comprehensive measurement tool is needed to enable assessment of a broader range of factors related to diabetes empowerment. As a result of the analyses, this scale, whose validity and reliability in Turkish have been confirmed for diabetic patients, will make an important contribution to the literature.

Implications for research, policy and practice

The low number of items simplifies both the implementation and evaluation. This scale can be used easily in diabetic patients. It is believed that using the scale will be useful for assessing the empowerment status of Turkish diabetes patients and will help determine whether they need diabetes management and psychological support.

LIMITATIONS

When adapting this scale to Turkish, 20.7% of the sample consisted of patients with type 1 diabetes and 79.3% with type 2 diabetes. Therefore, it can be said that the scale is mostly aimed at patients with type 2 diabetes. This is the limitation of the study.

CONCLUSION

Validity-reliability of the Turkish version of the McGill Empowerment Evaluation-Diabetes Questionnaire was conducted to evaluate the empowerment status of diabetic patients from different perspectives. 28-item and 4-factor structure of the original scale was confirmed in the present study. As a result, good level of validity and reliability results were obtained for MEA-D and cultural equivalence of the scale was ensured. With the use of this scale, basic data on the empowerment of diabetes patients will be provided for Turkish society.

Ethics Committe Approval

Ethics committee approval was received for this study from the Fırat University Ethics Committee (Date: 16.12.2021, and Approval Number: 2021/13- 36).

Author Contributions

Idea/Concept: G.B.T., Z.Ö., S.B.; Design: G.B.T., Z.Ö., S.B.; Supervision/Consulting: G.B.T., Z.Ö., S.B.; Analysis and/or Interpretation: G.B.T., Z.Ö., S.B.; Literature Search: G.B.T., Z.Ö., S.B.; Writing the Article: G.B.T., Z.Ö., S.B.; Critical Review: G.B.T., Z.Ö., S.B.

Peer-review

Externally peer-reviewed

Conflict of Interest

The authors have no conflict of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Acknowledgment

We are grateful to the individuals who participated in this study. This study did not receive any grants from any commercial funding agency or public or nonprofit actors.

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