The validity and reliability of the type 2 diabetes and health promotion scale Turkish version: a methodological study

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Objective: A healthy promotion is important for maintaining health and preventing complications in patients with type 2 diabetes.

Aim: The aim of the present study was to examine the psychometrics of a recently developed tool that can be used to screen for a health-promoting lifestyle in patients with type 2 diabetes.

Method: Data were collected from outpatients attending diabetes clinics. The Type 2 Diabetes and Health Promotion Scale (T2DHPS) and a demographic questionnaire were administered to 295 participants. Forward–backward translation of the original English version was used to develop a Turkish version. Internal consistency of the scale was assessed by Cronbach's alpha. An explanatory factor analysis and confirmatory factor analysis used

validity of the Type 2 Diabetes and Health Promotion Scale – Turkish version.

Results: Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity tests showed that the sample met the criteria required for factor analysis. The reliability coefficient for the total scale was 0.84, and alpha coefficients for the subscales ranged from 0.57 to 0.92. A six-factor solution was obtained that explained 59.3% of the total variance. The ratio of chi-square statistics to degrees of freedom (χ^2/df) 3.30 ($\chi^2 = 1157.48$/SD = 350); error of root mean square approximation (RMSEA) 0.061; GFI value of 0.91 and comparative fit index (CFI) value was obtained as 0.91.

Conclusions: Turkish version of The T2DHPS is a valid and reliable tool that can be used to assess patients' health-promoting lifestyle behaviours. Validity and reliability studies in different cultures and regions are recommended.

Keywords: diabetes, health promotion, scale, validity.

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Introduction

Type 2 diabetes mellitus is a chronic disease that is increasing in prevalence in the world and causing death. The burden of diabetes is increasing globally, particularly in developing countries. The causes are complex, but the increase is, to a great extent, due to rapid increases in cases of being overweight, plus obesity and physical inactivity (1). The worldwide prevalence of diabetes among adults has increase (2). Type 2 diabetes is a health problem with a long-term effect that causes irrecoverable structural and functional disorders in one or more systems where illnesses overlap (3). A health-seeking attitude in the patients with diabetes reduces and delays mortality, morbidity and complications caused by

diabetes (4). Improving health is not only about preventing disease as improving health involves the behaviour an individual displays long term in order to have a high standard of life (5). Designing an initiative to improve health is complicated and is composed of many factors. While designing a program, the nurse should assess if the initiative is appropriate for the target population (6). In order to conduct this assessment, it is necessary to develop tools.

According to Pender, healthy lifestyle behaviours are composed of self-efficacy, health responsibility, exercise, nutrition, interpersonal relationships and stress management (5). Patients with type 2 diabetes need to adopt a healthy lifestyle in order to improve their heath. In this way, they can stay clear from complications, their life quality will increase, and their lifespan will extend.

As with all other countries, because type 2 diabetes is increasing in Turkey, a tool to assess health-promoting behaviour for diabetes is needed. Chen et al developed Type 2 diabetes and health promotion scale (T2DHPS)

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for diabetic patients (7). Although validity and reliability studies of this scale were conducted in English, Chinese and Persian, there have been no validity and reliability studies conducted in the Turkish language. By using this scale, primary caretakers this scale, primary caretakers can perform a standard scaling in assessing the health-promoting behaviour of patients with type 2 diabetes. A tool, which can be used in assessing the health-promoting behaviour of patients with type 2 diabetes, will be a guide to identify the health-promoting behaviour of patients and help develop initiatives in Turkey. This validity and reliability study of the Type 2 Diabetes and Health Promotion Scale (T2DHPS) in Turkish responds to a need in this field. The validity and reliability study of this tool was undertaken for these reasons.

Materials and methods

The research sample, planned in methodological type, was composed of 295 patients with type 2 diabetes who had follow up appointments in the diabetic polyclinics of the three major hospitals in Erzurum and were chosen without probability. The participants of the study were (i) older than 18 years, (ii) diagnosed with diabetes at least 1 year previously, (iii) not pregnant, and (iv) were able to understand Turkish. The data were gathered between October 2015 and February 2016. The data were gathered through the face-to-face interview method.

Data collection tools

The Interview Form consisted of questions about the socio-demographic attributes (age, gender, education status and Diabetic duration) of the participants.

Type 2 diabetes and health promotion scale (T2DHPS): developed by Chen et al. (2013), this scale is a tool used in assessment of the determinants of the diabetic control of the diabetic patients. This scale is a tool, which provides the assessment of healthy or unhealthy lifestyles of patients with type 2 diabetes in the primary healthcare fields. This scale appears to be a useful screening tool for type 2 diabetic people in primary healthcare settings, promoting health status through modification of an unhealthy lifestyle. The scale consists of 28 items and six subscales. The simplified version of the T2DHPS was made up of six dimensions of behaviour: physical activity, risk reduction, stress management, enjoying life, health responsibility and a healthy diet. The scale is a 5-point Likert scale. The questionnaire used a 5-point response format to obtain data regarding the frequency of reported behaviours (never, rarely, sometimes, usually, always), with the rating score ranging from 1 to 5. The reliability coefficient for the total scale was 0.89, and alpha coefficients for the subscales ranged from 0.63 to 0.86. The first subscale of physical activity behaviour included seven items (1–7); subscale second was about risk reducing behaviour and included seven items (8–14); subscale third concerned stress management behaviours and included five items (15-19); subscale 4 was about the enjoyment of life and included three items (20-22); subscale 5 contained questions about health responsibility behaviours and included three items (23-25); and subscale 6 was about healthy diet and incorporated three items (26-28).

Assessment of the data and analyses

The software SPSS 12.0 and AMOS were used to assess the data. In this context, the validity of the language and content study was conducted first. The scale was translated by two independent linguists who speak English and Turkish. The first translator translated the scale to Turkish, while the second translator translated the already translated scale in Turkish to English. The scale translated to Turkish was then formed by the mutual decision of both linguists. After viewing the compatibility between the original English form and the back-translated form, the finalised Turkish form was submitted to a committee of experts, composed of eight people, for review. The experts were asked to evaluate each scale item's suitability and understandability according to the content validity index (CVI) on a point scale from 1 to 4 (1 point: Not suitable; 2 points: Partly suitable, so revision of the item/statement was needed; 3 points: Rather suitable (suitable, but little adjustments were needed); 4 points: Very suitable) (8). Eighty per cent of the scale items were expected to get 3 points or above and the items that got less than 3 points were reviewed and necessary adjustments were made. According to the percentage evaluation made in the study, the CVI of the T2DHPS was found to be 0.96.

In order to test structural validity, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted. For the confirmatory factor analysis, the multiple fit indexes of chi-square goodness, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Standardised Root Mean Square Residuals (SRMR) and Root Mean Square Error of Approximation (RMSEA) were analysed. In the fit indexes, the scale was accepted to be >0.90 for GFI, AGFI and CFI and <0.05 for RMSEA and SRMR. On the other hand, the value <0.08 was taken to be the acceptable goodness of fit for RMSEA and SRMR. Also, while it was preferable that the value χ^2/SD be ≤2, the model was also considered to be acceptable in situations when this value went below 5 (8).

Cronbach's Coefficient Alpha was calculated to test the internal consistency of the scale (9).

Ethical matters

Cooperation was provided by obtaining written permission from the necessary persons for the use of T2DHPS. The compatibility of the study with ethical principles was evaluated by the Ethics Committee of Erzurum Regional Training and Research Hospital. Written permission was received from the directors of the Erzurum Regional Training and Research Hospital in order for the study to be carried out. In the process of gathering data, questions of the patients who agreed to participate in the study were answered and individual counselling was conducted in line with care necessities.

Results

58.3% of the participants were female and those with no education at all (28.8%) and those with elementary education (43.7%) predominated. The mean age was 57.38 ± 13.80, and Diabetic duration was 9.73 ± 7.98 (Table 1).

Exploratory factor analysis

The items were subjected to factor analysis in order to analyse their factorial structure. KMO coefficient and Bartlett's test results were observed to determine whether the data set was fit for factor analysis.

Kaiser-Meyer-Olkin measure of sampling adequacy value was 0.845. Since the KMO coefficient was close to 1 and the Bartlett's Test of significance level was $p < 0.05$, the data set was found to be fit for factor analysis.

Twenty-eight items were weighted under six factors according to the total explained variance given on Table 3. These six factors explain 59.34% of the total variance.

Table 1 Socio-demographic characteristics of participants

	n	*%*
Gender		
Female	172	58.3
Male	123	41.7
Total	295	100.0
Education status		
None	85	28.8
Elementary	129	43.7
Middle school	28	9.5
High school	35	11.9
University	18	6.1
Total	295	100.0
	Min.-Max	Mean $\pm$ SD
Age	18.00–88.00	57.38 ± 13.80
Diabetic duration	1.00–41.00	9.73 ± 7.98

The models that were determined by exploratory factor analysis and by hierarchical clustering were tested with confirmatory factor analysis (Table 2).

Chi-squared statistics indicated a lack of compliance (10–13). Accordingly, the low test statistics showed that the model was fit for observational structure and the high statistical values showed that the model is not fit for observational structure. In other words, the model does not sufficiently explain the observed structure. However, the chi-square/degree of freedom analysis is used because the more variables there are, the higher the values will come out, since chi-squared statistics are summation statistics. If this value is lower than 5, then it is considered that the model has goodness of fit. If it is lower than 3, it is considered the model has a very nice goodness of fit (14, 15).

As a result of the conducted analysis, the ratio of the obtained chi-square statistics to the degrees of freedom is (χ^2/df) 3.30 ($\chi^2 = 1157.48$, SD = 350); the root mean square error of approximation (RMSEA) 0.061; the GFI value is 0.91, and the comparative fit index (CFI) is 0.91 (Table 2).

The T2DHPS-Turkish Cronbach's coefficient alpha values vary between 0.57 and 0.92. T2DHPS consists of 6 subscales. The scale is composed of six dimensions in the Turkish form, as well as in the original. Factor 1, the first subscale consists of seven items that include physical activity behaviour. The Cronbach's coefficient alpha value of this subscale is 0.92. Factor 2, the second subscale of the scale, is composed of seven items that include risk reduction behaviour. The Cronbach's coefficient alpha value of this subscale is 0.57. Factor 3 is composed of five items that include stress management behaviour, the third subscale of the scale. The Cronbach's coefficient alpha value of this subscale is 0.67. Factor 4 is composed of three items that include enjoyment of life, the fourth subscale of the scale. The Cronbach's coefficient alpha value of this subscale is 0.68. Factor 5 concerns health responsibility behaviour and consists of three items. The Cronbach's coefficient alpha value of this subscale is 0.73. Finally, Factor 6 is healthy diet, the sixth subscale of the scale, and this consists of three items. The Cronbach's coefficient alpha value of this subscale is 0.80. The Cronbach's coefficient alpha value of the all twenty-eight items of the T2DHPS-Turkish is 0.84 (Table 3).

Table 2 Model fit indices of the Turkish version of T2DHP2

Chi-square/SD	3.307
GFI	0.823
AGFI	0.764
CFI	0.910
NFI	0.90
RMSA	0.061

Table 3 T2DHPS Turkish version and subscale Cronbach's Coefficient Alpha values

	Number of items	Cronbach's α
Factor 1	7	0.92
Factor 2	7	0.57
Factor 3	5	0.67
Factor 4	3	0.68
Factor 5	3	0.73
Factor 6	3	0.80
T2DHPS-Turkish	28	0.84

Discussion

Along with explanatory factor analysis, Kaiser-Meyer-Olkin (KMO) and Bartlett testing was carried out in order to test whether the variables correlate with each other. The fact that the KMO value is below 0.50 shows that the sample size is not sufficient. In our study, the KMO value indicates that we have obtained a sufficient sample for our study.

If the comparative fit index and GFI values of a model are above 0.90, it shows that it fits well (14, 15). That the RMSEA value is 0.08 or below also shows that it fits wells. The result of our study shows that it fits wells.

The Cronbach's alpha coefficients of the entire scale and subscale were to determine reliability of the scale. There were similarities between this study and the original scale created by Chen et al. (7). There were also similarities between the Type 2 Diabetes and Health Promotion Scale (T2DHPS) Cronbach's alpha coefficients found by studies in Taiwan and Iran and the Turkish T2DHPS. The Cronbach's alpha coefficient of the subscale of the T2DHPS-Turkish was consistent with these studies (7, 16).

The subscale including physical activity behaviours has the highest Cronbach's alpha value of the scale's subscales. This subscale also has the highest Cronbach's alpha coefficients in the original scale by Chen et al. (7) and the Persian scale by Saffari et al. (16). This finding gives rise to the thought that patients with type 2 diabetes in the societies of Turkey, Taiwan and Iran have similar perceptions in terms of physical activity.

The lowest Cronbach's alpha value among the subscales of the T2DHPS-Turkish scale was found in risk reduction, the second subscale of the scale. This value is lower than those found by Chen et al. for the original scale and the Persian scale by Saffari et al. (7, 16). This result may be the consequence of a hallmark of Turkish society.

The Cronbach's alpha coefficient of the stress management behaviour subscale, the third dimension of the T2DHPS-Turkish, is lower than that of the original T2DHPS conducted by Chen et al. (7). Compared to the Persian T2DHPS study conducted by Saffari et al., (16) the Cronbach' alpha coefficient in this study for stress management behaviour subscale was higher. These

different values may indicate intercultural differences, as well as being the result of D Type personality.

In the enjoyment of life subscale, the fourth subscale of the T2DHPS-Turkish, the Cronbach's alpha value was lower than the value found by Chen et al. (7) for the original scale. In the Persian T2DHPS by Saffari et al., (16) the Cronbach's alpha value of the enjoyment of life subscale was also low. According to the findings obtained from Iranian and Turkish societies, levels of stress management and the enjoyment of life are lower compared to those in Taiwanese society. This shows that lifestyles in the Middle East and the Near East are similar to each other, while that of the Far East is different from both of them.

In the health responsibility behaviours subscale, the fifth subscale of the T2DHPS-Turkish scale, the Cronbach's alpha value was closer to the value found by the Persian version of this scale (16). However, the value in the Turkish scale is higher than that of the study by Chen et al. (7).

In the healthy diet subscale, the sixth subscale of the T2DHPS, the Cronbach's alpha coefficient was quite high compared to the original scale by Chen et al. (7) and the Persian scale by Saffari et al. (16). These results show health responsibility behaviours quite similar to the results of the Persians and suggest that, although the subscale of healthy diet are close to each other in the studies of Chen and Saffari, it had a higher value in our study. This result gives rise to the thought that patients with type 2 diabetes in Turkish society have a more sensitive perception of a healthy diet. This may be caused by the fact that there are few items in the subscales of risk reduction, stress management and enjoyment of life, subscales with a lower Cronbach's coefficient alpha value than 0.70 (16). Therefore, it can be said that when the Cronbach's coefficient alpha values in our study are considered, the validity level of our scale is sufficient.

Conclusion

The Turkish version of Type 2 Diabetes and Health Promotion Scale (T2DHPS) can be used as a whole or separately to assess the health-promoting behaviour of patients with type 2 diabetes.

Author contribution

Esra Yildiz did statistical analysis and wrote manuscript. Esin Kavuran take permission from Chen and pile up the data.

Ethical approval

We confirm that we have ethical council decision from Erzurum Regional Hospital's ethic council. We consider ethical rules.

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