

The reliability and validity of the pediatrics quality of life inventoryTM (PedsQL) diabetes module 3.0 for Turkish adolescents with type 1 diabetes

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Received: 23 September 2013 / Accepted: 8 September 2014
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Abstract Adolescents might experience difficulties in compliance to diabetes management and their quality of life might be adversely affected. No specific quality of life scale is available in Turkey for adolescents aged 13–18 years with diabetes. The aim of the study was to examine the psychometric properties of the PedsQLTM 3.0 Diabetes Module (PedsQLTM 3.0 DM) Teen and Parent Reports (Ages 13–18) in Turkish adolescents with type 1 diabetes. One hundred and four adolescents aged 13–18 years with type 1 diabetes and their parents who presented at a diabetes center participated in this study. Content, construct, and concurrent validities, internal consistency reliability and item-total correlations were analyzed in order to determine the psychometric properties of the scales. Construct validity was evaluated with explanatory factor analysis. The factor structure of the Turkish version PedsQLTM diabetes module consisted of four subscales and did not support the original five-factor structure. Concurrent validity was analysed with Spearman Correlation and a positive significant correlation was found between PedsQLTM 3.0 DM and PedsQLTM 4.0 Generic Core Scales. Cronbach's alpha was found to be 0.92 for child self-reports (CSR) and

0.88 for parent proxy-report (PPR) of PedsQLTM 3.0 DM. The psychometric analyses of the Turkish version of PedsQLTM 3.0 DM Teen and Parent Reports indicate high reliability and good content and construct validity for measuring diabetes-specific health related quality of life in Turkish adolescents with type 1 diabetes.

Keywords Quality of life · Type 1 diabetes mellitus · Adolescent · Validity · Reliability · Turkey

Introduction

Type 1 diabetes is one of the most common chronic diseases seen in children and adolescents [1, 2]. Individuals with type 1 diabetes constitute 5–10 % of all diabetics in the world [3]. There are no recent studies which determine the incidence and/or prevalence of T1DM in Turkey [4, p.187]. However, according to the incidence study performed in 1996 with children between the ages of 0–15 who had Type 1 diabetes (The National Children's and Adolescents' Diabetes Data Collection Study (UÇADİVET)), this rate was found to be 2.52 in 100.000 yearly [5]. Local studies indicate, just like studies worldwide, that the incidence of Type 1 diabetes is increasing and that the starting age of Type 1 diabetes, which is usually adolescence, is sliding towards the ages between 5–9. In our country, the total number of minors under the age of 18 who have diabetes is estimated to be around 15,000 [4, p.187]. Self-monitoring constitutes a major part of diabetes management [1]. When diabetes is managed effectively, long-term complications are prevented or delayed. However, many children/adolescents with diabetes cannot comply with diabetes management due to various reasons such as wanting to be independent, avoiding the responsibilities regarding diabetes management and complexity of diabetes management [1, 6]. As a result, their quality of life is adversely affected [1, 7, 8].

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According to the definition of the World Health Organisation (WHO) “*Quality of life is defined as individuals' perceptions of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.*” [9, p.5]. Assessment of quality of life via psychological tests play an important role in determining the impact of the treatment process on an individual's quality of life and in determining related health policies. Treatment and assessment of diseases and disease approaches in adolescents is different from those in children and adults. These differences should also be considered when measuring the quality of life in adolescents [10].

Improving the quality of life of an adolescent with diabetes is a dynamic process that differs in characteristics with each individual and that requires different personal approaches [11]. In providing the best glycemic control with the least amount of medical help in diabetes management, holistic care and an interdisciplinary team approach increases success. In such a team, members of various disciplines such as a medical doctor, nurse, dietician, pharmacist, psychologist, social services professional, and a podiatrist would be present [11, 12]. However, diabetes nurses spend more time with adolescent with diabetes and his/her parents. Therefore, they play a key role in increasing the adolescent's quality of life. In diabetes nursing, interventions aimed at maintaining quality of life provide appropriate nursing care for adolescents with diabetes, which, in turn, lead to relief and improvements in physical, emotional and psychosocial functioning [13, 14]. Measuring quality of life in adolescents with diabetes creates the opportunity to assess the impact of treatment and care practices on all aspects of life from the adolescent's point of view. Furthermore, measuring adolescents' quality of life guides nursing studies which evaluate nursing practices and the quality of care as well as contributing to the development alternative diabetes management strategies [14].

No specific quality of life scale is available for adolescents aged 13–18 years with diabetes in Turkey. Thus, the necessity of adapting the Pediatric Quality of Life Inventory™ (PedsQL) Diabetes Module 3.0 Teen Report (Ages 13–18) and Parent Report for Teens (Ages 13–18) to the Turkish population became apparent. Mean Cronbach's alpha values of the PedsQL™ Diabetes Module 3.0 scales, which include 28 items, is 0.71 for child report and 0.77 for parent report [15]. Validity and reliability studies of the PedsQL™ Diabetes Module 3.0 scales were conducted in many countries including Sweden, Iran, Greece, and Hungary [7, 8, 16–18].

The aim of the study was to examine the psychometric properties of the PedsQL™ 3.0 Diabetes Module Teen and Parent Report (Ages 13–18) in Turkish adolescents with type 1 diabetes.

Methods

Participants

A total sample of 104 adolescents aged 13–18 years with type 1 diabetes and their parents who applied to a university hospital were invited to participate in this study. This hospital in the city of Istanbul in Turkey has a sizeable diabetes center where many children with diabetes are followed-up and monitored. Volunteering adolescents with duration of diabetes of 1 year or more who regularly attended routine check-ups (every 3 months) were included in the study since adaptation to a chronic disease takes approximately 6 months–1 year [19]. Therefore, adolescents with duration of diabetes of 1 year or more were deemed to be appropriate for participation in the study, considering the adaptations process of adolescents with diabetes. The mean age of the participants was 14.65 ± 1.51 ; where 51.9 % ($n=54$) were girls and 48.1 % ($n=50$) were boys. For 36.5 % ($n=38$) the duration of diabetes was 1–3 years, for 36.5 % ($n=38$) it was 4–6 years, and for 26 % ($n=27$) it was 7 years or above. The mean HbA1C values were 8.67 ± 2.04 .

Design

A methodological design was used. Methodological design is a process used to determine the validity and reliability of instruments in order to measure constructs used as variables in research [20, p.114]

Instruments

The Pediatric Quality of Life Inventory (PedsQL) 4.0 Generic Core Scales (GCS) The parent/child should first complete the PedsQL™ Generic Core Scales and then complete any additional PedsQL™ Module [21]. Therefore, PedsQL™ 4.0 Generic Core Scales (GCS) Teen Report (Child Self Report-CSR and Proxy Parent Report-PPR) was used to assess concurrent validity. The Pediatric Quality of Life Inventory (PedsQL) is a modular instrument designed to measure health-related quality of life (HRQOL) in children and adolescents aged 2–18 years. The PedsQL 4.0 Generic Core Scales are child self-report and parent proxy-report scales developed as the generic core measure to be integrated with the PedsQL disease-specific modules [15]. Child self-report includes ages 5 to 7, 8 to 12, and 13 to 18 years. Parent proxy-report includes ages 2 to 4 (toddler), 5 to 7 (young child), 8 to 12 (child), and 13 to 18 (adolescent), and assesses parent's perceptions of their child's HRQOL. The 23-item PedsQL GCS 4.0 included physical functioning (8 items), emotional functioning (5 items), social functioning (5 items) and school functioning (5 items). The instructions ask how much of a problem each item has been during the past 1 month on a five-point Likert-

type response scale. (0=never a problem; 1=almost never a problem; 2=sometimes a problem; 3=often a problem; 4=almost always a problem). Items are reverse-scored and linearly transformed to a scale ranging from 0 to 100 (0=100, 1=75, 2=50, 3=25, 4=0). Total scores and subscale scores are computed as the sum of the items divided by the number of items answered. Higher scores indicate better quality of life. If more than 50 % of the items on the scales are missing, the scale score is not computed [22]. The validity study for the Turkish version of the scale's form for ages 13–18 was performed in 2007 by Çakın Memik et al. The Cronbach's alpha value was 0.82 for the adolescent form and 0.87 for the parent form [10].

Pediatric Quality of Life Inventory (PedsQL) 3.0 Diabetes Module The PedsQL 3.0 Type 1 Diabetes Module was designed to measure diabetes-specific HRQOL. Child self-report includes ages 5 to 7, 8 to 12, and 13 to 18 years. Parent proxy-report includes ages 2 to 4 (toddler), 5 to 7 (young child), 8 to 12 (child), and 13 to 18 (adolescent), and assesses parent's perceptions of their child's diabetes-specific HRQOL. The 28-item multidimensional PedsQL™ 3.0 Diabetes Module included five subscales, which are diabetes symptoms (11 items), treatment barriers (4 items), treatment adherence (7 items), worry (3 items), and communication (3 items). The format, instructions, Likert type response scale, and the scoring method are identical to the PedsQL™ GCS 4.0, with higher scores indicating fewer symptoms or problems [15].

Data collection

Data was collected by the researchers between October 2011 and November 2012 during routine controls of adolescents at the diabetes polyclinic. Adolescents and parents filled the scales themselves. Researchers accompanied adolescents and parents during data collection. Therefore, there is no missing data. Data collection took approximately 10 to 15 min.

Validation

Permission was received from the MAPI TRUST Institute. The linguistic validation process consisted of 2 phases: forward translation and backward translation. PedsQL™ 3.0 Diabetes Module Scales Teen Report was first translated from English to Turkish separately by three bilingual linguistic, medical and nursing professionals and then the scales were translated back from Turkish to English by two different bilingual language experts. The back-translated and original scales were compared and found to be highly similar. The Turkish translation of the scales was presented to the opinion of seven people who were experts in nursing and health sciences in order to test understandability and cultural suitability. *Content validity* was achieved by making necessary

corrections on the basis of minor suggestions such as word or sentence corrections. A preliminary administration was carried out with 25 adolescents with type 1 diabetes in order to ensure *face validity*.

Data analysis

NCSS (Number Cruncher Statistical System) 2007 & PASS (Power Analysis and Sample Size) 2008 Statistical Software (Utah, USA) were used for statistical analyses. Validity and reliability analyses were assessed by calculating reliability statistics and Cronbach's Alpha coefficients in addition to descriptive statistical methods (mean, standard deviation, frequency and ratio). Results obtained by applying principal component analysis and varimax rotation were used in the explanatory factor analysis of the Diabetes Module. Spearman Correlation Analysis was used for the assessment of relations between scale scores.

Ethical considerations

A written consent was obtained from the hospital where the study was conducted. After the adolescents and their families were informed about the purpose of the study, the types of scales that would be used, how long data collection would take, how all information pertaining to them would be confidential, and how they could leave the study any time they want, all adolescents and their parents volunteering to participate in the study separately provided written informed consents. We did not obtain a written document from the ethical committee because the hospital did not consider it necessary. The study was carried out in accordance with the principles of the Declaration of Helsinki.

Results

A total sample of 104 adolescents aged 13–18 years with type 1 diabetes participated in the Turkish validity and reliability study of PedsQL™ 3.0 Diabetes Module (DM) Teen Report (Child Self Report-CSR and Parent Proxy Report-PPR).

Validity

Content Validity

The content validity of the scales were assessed by an expert panel of seven academicians and health professionals working on diabetes (one professor in internal diseases nursing, one professor in community health nursing, one professor in pediatric nursing, one assistant professor in pediatric nursing, one assistant professor in community health nursing, one

psychologist in pediatrics, and one pediatric diabetes nurse). Minor corrections were applied in accordance with the experts' recommendations. Kendall's W concordance analysis was conducted in order to assess the content validity of CSR and PPR of The PedsQL™ 3.0 DM and it was found that there was concordance among experts (Kendall's $W^a=0.206$, $df=27$, $\chi^2=38.89$, $p=0.065$). A subtype of content validity is face validity, which is a rudimentary type of validity that basically verifies that the instrument gives the appearance of measuring the concept [23, 24]. Face validity of the scales were assessed with a pilot study conducted on 25 adolescents with type 1 diabetes and their parents, and no negative feedback was received.

Construct Validity

The adequacy of the items was assessed in terms of item content. The original PedsQL™ 3.0 DM contains five subscales: diabetes symptoms, treatment barriers, treatment adherence, worry, and communication. Although the original PedsQL™ 3.0 DM contained five subscales in the explanatory factor analysis, the treatment barriers and treatment adherence subscales were evaluated as the Treatment subscale because of their compatibility with regard to the contents of their questions and, the Turkish validity and reliability study of PedsQL™ 3.0 DM was continued with four subscales: diabetes symptoms, treatment, worry, and communication. The four factors explained 57.99 % of the variance in CSR and 56.96 % of the variance in PPR. The Kaiser-Meyer-Olkin measure was 0.79 in CSR and 0.75 in PPR, indicating the applicability of explanatory factor analysis. Bartlett's test of sphericity was statistically significant in both CSR ($\chi^2=1503.65$; $p=.001$) and PPR ($\chi^2=1445.83$; $p=.001$). The acceptable level for scales items was above 0.30 [25] in the results of explanatory factor analysis (Table 1).

Concurrent Validity

Concurrent validity was assessed through an analysis of the intercorrelations between the PedsQL™ 4.0 GCS total scores and the PedsQL™ 3.0 DM Teen Report subscales. Intercorrelations are shown in Table 2.

Reliability

The total-item and internal consistency reliability values of the subscales are shown in Table 3. The PedsQL™ 3.0 DM had a Cronbach's alpha of 0.92 in CSR and 0.88 in PPR. Item-total correlations are shown in Table 1 and ranged from 0.33 to 0.70 in CSR and from 0.33 to 0.73 in PPR.

Discussion

The main characteristics sought for in a good measurement tool are reliability and validity [20, p.114]. The psychometric properties of the Turkish version of PedsQL™ 3.0 DM were measured with a wide range of methods and statistical analyses. This improved the strength of validity and reliability.

Validity

Content validity represents the universe of content or the domain of given constructs [23, 24]. Kendall's W concordance analysis was conducted to assess content validity in this study. As a result of the test, no meaningful difference was found among the views of the experts. Accordingly, the terms in the scale are appropriate for our culture and represent the field that is to be measured.

Construct validity was supported by the results of the explanatory factor analysis. The factor analytical approach is a procedure that gives the researcher information about the extent to which a set of items measures the same underlying construct [23, 24]. In this study, acceptable factor loadings for the scales items were above 0.30 [25] and therefore, no items from the original scale was excluded. The original PedsQL™ 3.0 DM child and adolescent forms consisted of five subscales, whereas the Turkish version comprised of four subscales. Similarly, factor loadings of both child and parent's forms were gathered in four subscales since it was impossible to do so in five subscales in the study by Nansel et al. (2008) [26]. The PedsQL™ 3.0 DM scale is a valid scale for Turkish adolescents with type 1 diabetes which has four subscales.

Concurrent validity refers to the degree of correlation between two measures of the same concept administrated at the same time [23, 24]. The intercorrelation between PedsQL™ 4.0 GCS subscales scores and the PedsQL™ 3.0 DM subscales scores ranged from 0.36 to 0.71 in CSR and 0.36 to 0.62 in PPR. The intercorrelations had from medium to large effect sizes, which confirmed the concurrent validity of the PedsQL™ 3.0 DM. These findings are consistent with earlier studies [7, 8, 16–18]. No correlation between PedsQL™ 3.0 DM Communication subscale and PedsQL™ 4.0 GCS Physical Functioning Scale Score was found in both CSR and PPR forms because PedsQL™ 4.0 GCS Physical Functioning Scale Score only investigates behaviors related to physical activities such as running and swimming; whereas PedsQL™ 3.0 DM Communication subscale investigates communications with the healthcare personnel and other individuals. Therefore, it was expected that there will be no correlation between these two scales.

Table 1 Characteristics of Subscales in PedsQL™ 3.0 DM child-self-report (CSR) and parent proxy-report (PPR) (N=104)

PedsQL™ 3.0 DM Subscales						
CSR	PPR	CSR Mean± SD	Factor load	Item to total correlations	PPR Mean± SD	Factor load
Diabetes symptoms						
I feel hungry	Feeling hungry	49.76±28.83	0.377	0.544	46.15±28.89	0.623
I feel thirsty	Feeling thirsty	57.45±30.74	0.600	0.628	55.53±30.16	0.788
I have to go to the bathroom too often	Having to go to the bathroom too often	71.63±28.53	0.545	0.502	65.87±32.13	0.788
I have stomachaches	Having stomachaches	78.37±23.64	0.678	0.453	75.00±26.07	0.634
I have headaches	Having headaches	68.27±26.35	0.666	0.477	66.59±27.78	0.467
I go "low"	Going "low"	71.39±29.65	0.369	0.590	65.87±29.57	0.352
I feel tired and fatigued	Feeling tired and fatigued	60.34±31.08	0.575	0.623	55.53±27.86	0.450
I get shaky	Getting shaky	83.17±24.50	0.475	0.386	79.33±23.74	0.482
I get sweaty	Getting sweaty	69.47±30.36	0.734	0.413	69.23±28.14	0.594
I have trouble sleeping	Having trouble sleeping	81.49±29.56	0.320	0.450	79.57±29.92	0.422
I get irritable	Getting irritable	48.32±34.88	0.629	0.651	42.79±29.08	0.310
Treatment						
It hurts to prick my finger or give insulin shots	Needle sticks (i.e. injections/blood tests) causing him/her pain	74.76±27.54	0.410	0.552	63.70±30.15	0.517
I am embarrassed about having diabetes	Getting embarrassed about having diabetes	89.42±24.06	0.305	0.489	76.68±31.79	0.776
My parents and I argue about my diabetes care	Arguing with me or my spouse about diabetes care	73.80±27.73	0.599	0.463	58.89±31.91	0.743
It is hard for me to stick to my diabetes care plan	Sticking to his/her diabetes care plan	66.83±31.05	0.720	0.554	48.80±32.75	0.539
It is hard for me to take blood glucose tests	It is hard for my teen to take blood glucose tests	84.38±27.69	0.522	0.431	75.96±32.85	0.695
It is hard for me to take insulin shots	It is hard for my teen to take insulin shots	81.97±30.66	0.528	0.643	79.57±30.32	0.441
It is hard for me to exercise	It is hard for my teen to exercise	89.90±17.94	0.396	0.432	72.84±30.79	0.269
It is hard for me to keep track of carbohydrates or exchanges	It is hard for my teen to track of carbohydrates or exchanges	67.55±32.66	0.396	0.642	56.01±33.14	0.321
It is hard for me to wear my ID bracelet	It is hard for my teen to wear his/her ID bracelet	75.24±37.76	0.382	0.327	59.86±43.57	0.582
It is hard for me to carry a fast-acting carbohydrate	It is hard for my teen to carry a fast-acting carbohydrate	79.09±28.96	0.824	0.575	67.55±37.34	0.766
It is hard for me to eat snacks	It is hard for my teen to eat snacks	77.64±28.92	0.774	0.580	73.32±30.62	0.679
Worry						

Table 1 (continued)

PedsQL™ 3.0 DM Subscales							
I worry about “going low”	Worrying about “going low”	81.49±26.30	0.697	0.619	72.12±29.42	0.748	0.732
I worry about whether or not my medical treatments are working	Worrying about whether or not medical treatments are working	74.04±30.75	0.656	0.695	69.23±31.59	0.650	0.656
I worry about long-term complications from diabetes	Worrying about long-term complications of diabetes	71.63±32.13	0.652	0.700	68.99±31.83	0.506	0.720
Communication							
It is hard for me to tell the doctors and nurses how I feel	Telling the doctors and nurses how he/she feels	80.53±27.20	0.795	0.575	61.78±37.51	0.877	0.380
It is hard for me to ask the doctors and nurses questions	Asking the doctors and nurses questions	84.38±25.88	0.818	0.434	61.06±37.49	0.800	0.353
It is hard for me to explain my illness to other people	Explaining his/her illness to other people	76.92±30.51	0.730	0.674	58.17±38.07	0.777	0.387

Reliability

The reliability of a research instrument is defined as the extent to which the instrument yields the same results on repeated measures [23]. A level of Cronbach's alpha at 0.70 or higher is considered to be an acceptable level of reliability [23, 25]. There are five major tests of reliability that can be used. The test used depends on the nature of the instrument. They are known as test-retest, parallel or alternate form, item-total correlation, split-half, Kuder-Richardson (KR-20), Cronbach's alpha, and interrater reliability [23]. In this study, item-total correlation and Cronbach's alpha was used for testing internal consistency reliability. The PedsQL™ 3.0 DM had a Cronbach's alpha of satisfactory internal consistency. Cronbach's alpha coefficients varied between 0.88 and 0.91 for CSR and PPR in Sand's (2012) [8] and Lukác's (2012) [18] studies and are similar to our findings. Furthermore, the Cronbach's alpha values in our study were higher compared to those in the studies of Jafari (2012), Varni (2003), Emmouilidou (2008), Abdoul-Rasoul (2012) and Nansel (2012) [7, 15–17, 26]. Item-total correlations of all items were above 0.30 in this study. Therefore, no items were excluded from the original scale.

Limitations

This study has some limitations. First, the study was carried out only in one diabetes center. For this reason, the sample size of the study is limited. Second, results of the study can only be generalized to Turkish adolescents aged 13–18 years with diabetes who has a duration of diabetes of 1 year or more. The scale is not appropriate for use in people with diabetes between the ages of 13–18 whose duration of diabetes is below one year. As a third factor, adolescents with other co-morbid disorders (celiac diseases etc.) were not included in the study.

Conclusion and Recommendations

The psychometric analyses of the Turkish version of PedsQL™ 3.0 DM Teen and Parent Reports indicate high reliability and good content and construct validity. Based on these findings, it can be concluded that the Turkish version of PedsQL™ 3.0 DM is a useful instrument for measuring diabetes-specific health related quality of life in Turkish teens aged 13–18 years with type 1 diabetes. The applicability of the scale should be tested for adolescents between the ages of 13–18 whose duration of diabetes is below one year and those who have other co-morbid disorders. This instrument can be easily used by pediatric diabetes nurses. In addition, it is thought that PedsQL™ 3.0 DM forms a basis for

Table 2 Intercorrelation between PedsQL™ 3.0 DM and PedsQL™ 4.0 GCS (N=104)

PedsQL™3.0 DM Subscales		PedsQL™ 4.0 GCS			
		Physical Functioning Scale Score		Psychosocial Health Summary Score	
		r	p	r	p
PedsQL™3.0 DM Child Self Report	Diabetes Symptoms	0.462	0.001**	0.753	0.001**
	Treatment	0.340	0.001**	0.600	0.001**
	Worry	0.215	0.028*	0.591	0.001**
	Communication	0.187	0.057	0.341	0.001**
	Total	0.369	0.001**	0.716	0.001**
PedsQL™3.0 DM Proxy Parent Report	Diabetes Symptoms	0.528	0.001**	0.756	0.001**
	Treatment	0.212	0.031*	0.407	0.001**
	Worry	0.282	0.003**	0.486	0.001**
	Communication	0.108	0.277	0.198	0.044*
	Total	0.364	0.001**	0.621	0.001**

r::Spearman's Correlation Coefficient * $p < 0.05$ ** $p < 0.01$

interventions which support adolescents' and their parents' quality of life in a positive way and improve the quality of nursing care. Nursing care provided for children and adolescents with diabetes is not the sole responsibility of pediatric diabetes nurses in Turkey. Pediatric diabetes nurses also care for children and adolescents with endocrinologic disorders. This, in turn, increases the work burden of diabetes nurses and limits the time spent for the care of adolescents with diabetes. Diabetes nurses will be able to detect problems which have a negative impact on diabetes-specific health related quality of life among adolescents with diabetes and to increase the quality of care provided for them by using this scale. This scale can provide a guideline for developing new scales in our country on the subject.

Acknowledgments We thank all adolescents with type 1 diabetes and their families for participating in the study and diabetes nurse Saliha YILMAZ who supported us during the study. We also thank Prof. Dr. Nermin OLGUN, Prof. Dr. Suzan YILDIZ, Prof. Dr. Semra ERDOĞAN, Asst. Prof. Dr. Zerrin Çiğdem, Asst. Prof. Dr. Ayşe Ergün, Diabetes Nurse Saliha Yılmaz, and Specialist Psychologist Derya TOPARLAK for their expert opinions.

Table 3 Internal consistency reliability for PedsQL™ 3.0 DM total-items and subscales in child-self-report (CSR) and parent proxy-report (PPR) (n=104)

PedsQL™3.0 DM	Items	Cronbach's alpha	
Subscales	CSR/PPR	CSR	PPR
Diabetes symptoms	11	0.868	0.878
Treatment	11	0.796	0.748
Worry	3	0.749	0.771
Communication	3	0.831	0.814
Total-items	28	0.916	0.883

Conflict of interest No potential conflicts of interest relevant to this article were reported.

References

- Helgeson VS, Snyder PR, Escobar O, Siminerio L, Becker D. Comparison of Adolescents with and without Diabetes on Indices of Psychosocial Functioning for Three Years. *J Pediatr Psychol*. 2007;32:794–806.
- Graue M, Wentzel-Larsen T, Hanestad BR, Batsvik B, Søvik O. Measuring self-reported, health-related, quality of life in adolescents with type 1 diabetes using both generic and disease-specific instruments. *Acta Paediatr*. 2003;92:1190–6.
- American Diabetes Association (ADA). Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 2013;36:S67–74. Suppl. 1.
- Çocukluk Çağında Diyabet Bakım ve Tedavisinin Geliştirilmesi. In: Türkiye'de Diyabet Profili Çalıştay Raporu 2009. www.toplumsalbilinc.org/forum/index.php?action=dlattach;topic=18146.0;attach=3023 Accessed September 24, 2013. pp. 185–206.
- Günöz H, Oraltay İşgüven P, National Working Group for Child and Adolescent Diabetes. *Diabetes. Nutr Metab (Lond)*. 1999;12:232.
- Nansel TR, Iannotti RJ, Simons-Morton BG, Cox C, Plotnick LP, Clark LM, et al. Short-term and 1-year outcomes of a diabetes personal trainer intervention among youth with type 1 diabetes. *Diabetes Care*. 2007;30:2471–7.
- Jafari P, Forouzandeh E, Bagheri Z, Karamizadeh Z, Shalileh K. Health related quality of life of Iranian children with type 1 diabetes: reliability and validity of the Persian version of the PedsQL™ Generic Core Scales and Diabetes Module. *Health Qual Life Out*. 2011;9:104.
- Sand P, Kljajic M, Schaller J, Forsander G. The reliability of the Health Related Quality Of Life questionnaire PedsQL 3.0 Diabetes Module™ for Swedish children with Type 1 diabetes. *Acta Paediatr*. 2012;101:e344–9.
- World Health Organization (WHO). WHOQOL-BREF Introduction, Administration, Scoring and Generic Version of the Assessment. Programme on Mental Health. World Health Organization, Geneva, 1996; 5.
- Çakın Memik N, Ağaoğlu B, Coşkun A, Üneri ÖŞ, Karakaya I. Çocuklar İçin Yaşam Kalitesi Ölçeğinin 13–18 Yaş Ergen

- Formunun Geçerlik ve Güvenilirliği. *Türk Psikiyatri Dergisi*. 2007;18:353–63.
11. Özcan Ş. Diabetes Mellitus' un Modern Tedavisi. Yılmaz T, Bahçeci M, Büyükbeşe M (eds). , İstanbul: Türkiye Diyabet Vakfı Yayını; 2003. pp. 189–195.
 12. Özcan Ş. Diabetes Mellitus'lu Hastanın Yönetimi ve Hemşirelik Bakımı. In: Yenigün M, Altuntaş Y, editors. *Her Yönüyle Diabetes Mellitus*. İstanbul: Nobel Tıp Kitabevleri; 2001. p. 969–96.
 13. Parsons C. Caring for adolescents and families in crisis. *Nurs Clin North Am*. 2003;38:111–22.
 14. Mollaoğlu M. Kronik Hastalıklarda Yaşam Kalitesi ve Hemşirelik. 2. Sağlıkta Yaşam Kalitesi Kongre Özet Kitabı 2007; 9–10.
 15. Varni JW, Burwinkle TM, Jenifer R, Jacobs JR, Gottschalk M, Kaufman F, et al. The PedsQLTM in Type 1 and Type 2 Diabetes Reliability and validity of the Pediatric Quality of Life InventoryTM Generic Core Scales and Type 1 Diabetes Module. *Diabetes Care*. 2003;26:631–7.
 16. Emmanouilidou E, Galli-Tsinopoulou A, Karavatos A, Nousia-Arvanitakis S. Quality of life of children and adolescents with diabetes of Northern Greek origin. *Hippokratia*. 2008;12:168–75.
 17. Abdul-Rasoul M, AlOtaibi F, AlMahdi M, AlKandari H. Reliability and validity of the Arabic version of the PedsQLTM 4.0 generic core scales and PedsQLTM 3.0 diabetes module. *Journal of Diabetes Mellitus*. 2012;2:301–7.
 18. Lukács A, Varga B, Barótfi S, Kiss-Tóth E, Barkai L. Health-Related Quality of Life of Youths with Type 1 Diabetes: Reliability and Validity of the Hungarian Version of the PedsQL 3.0 Diabetes Module. *J. Diabete Metab*. 2012;3:191.
 19. Çelik S, Sayıl I. Patolojik Yas Kavramına Yeni Bir Yaklaşım: Travmatik Yas. *Kriz Dergisi*. 2003;11:29–34.
 20. Emiroğlu O. Deneysel Tasarımlar. In: Erefe I (ed). *Hemşirelikte Araştırma İlke, Süreç ve Yöntemleri*. İstanbul: Odak Ofset. pp.91–124.
 21. PedsQL Administration Guidelines. <http://www.pedsq.org/pedsqadmin.html> Accessed January 3, 2011.
 22. Varni JW, Seid M, Kurtin PS. PedsQL 4.0: reliability and validity of the Pediatric Quality of Life Inventory version 4.0 generic core scales in healthy and patient populations. *Med Care*. 2001;39:800–12.
 23. Haber J, LoBiondo-Wood G. Reliability and Validity. In: LoBiondo-Wood G, Haber J, editors. *Nursing Research Methods and critical Appraisal for Evidence-Based Practice*. 6th ed. Missouri: Mosby Elsevier; 2006. p. 335–56.
 24. Wood MJ, Ross-Kerr JC. Reliability and Validity of Measurement in Basic Steps in Planning Nursing research 6th ed. Boston: MA: Jones and Barlett Publishers; 2006. pp.195–221.
 25. Şencan H. Cronbach Alfa Güvenirlilik Analizleri. In: Güvenirlilik ve Geçerlilik. Ankara: Seçkin Yayıncılık; 2005. p. 230–47.
 26. Nansel TR, Weisberg-Benchell T, Wysocki L, Laffel B, Anderson B, The Steering Committee of the Family Management of Diabetes Study. Psychology Quality of life in children with Type 1 diabetes: a comparison of general and diabetes-specific measures and support for a unitary diabetes quality-of-life construct. *Diabet Med*. 2008;25: 1316–23.