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ORIGINAL ARTICLE

Quality of life of children and adolescents with diabetes of Northern Greek origin

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Abstrat

Aim: To culturally adapt the diabetes- specific quality of life (QOL) instrument PedsQL 3.0 Diabetes Module (DM) and the generic QOL instrument PedsQL 4.0 Generic Core Scales (GCS) to the population of Greek diabetic children. Also, to evaluate QOL in youths with type 1 diabetes, compare it with that of healthy youths, and identify relationships between QOL and metabolic control and intensity of treatment.

Patients and Methods: Eighty nine (89) children and adolescents with type I diabetes and 89 without diabetes, all with their parents (2-18 years of age, diabetes duration >6 months) completed the Greek GCS. Those with diabetes also completed the Greek DM.

Results: Cronbach α coefficient of child and parent report of both instruments, in general approached 0.70, indicating their internal consistency reliability. Both instruments demonstrated positive intercorrelations with their total scores and subscales of DM demonstrated positive intercorrelations with total score of the generic instrument, supporting the validity of both instruments for the evaluation of QOL of Greek diabetic children. No statistically important differences were found among patient and parent report of diabetes and control group in both instruments. Exception was "Social functioning" in which children with diabetes reported better QOL. Growing age, female gender, large BMI, poor metabolic control and intensity of treatment did not influence QOL of children with diabetes.

Conclusions: Greek PedsQL GCS and DM have sufficient acceptability, reliability and validity so as to be used for the purposes of a comparative study. Youth with diabetes reported similar QOL with non-diabetic youth of the same age and socioeconomic status. Hippokratia 2008; 12 (3): 168-175

Key words: children, adolescents, type 1 diabetes, health-related quality of life (HRQOL), Pediatric Quality of Life Inventory (PedsQL)

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Health Related Quality of Life (HRQOL) constitutes a current field of extensive research of scientists involved in the medical and psychosocial care of children with diabetes. It is agreed that enhancing quality of life (QOL) and wellbeing is as important as metabolic control and prevention of secondary morbidity[1]. In the literature, children and adolescents with diabetes are described as reporting similar QOL to that of their healthy peers[1-7]. Increasing age and female gender predict deterioration of QOL[1,3,4,8-12]. Parental perception of the child's QOL is in most cases worse than the child's individual perception[2,5,6,13]. Risk factors for unsatisfactory QOL in diabetic children and adolescents are depression, one parent family, low socioeconomic status, and diabetes related family conflict[2,9,10,14-16]. Intensive treatment does not worsen QOL and in some cases it is related to better QOL[1,2,9]. The relationship between QOL and metabolic control, measured by HbA1c, is conflicting[1-3,5,8-14,16].

The aim of the present study was to evaluate QOL of diabetic children and adolescents in Northern Greece including the regions of Macedonia, Thessaly, and Thrace. Reporting QOL related to paediatric chronic diseases in a Mediterranean country such as Greece is important because of the different culture, which may differentiate the way the family and the society treat children with chronic diseases. In Greece, the dominant family model is that of close bonding, intervention and over protectiveness.

For the purposes of the study, we evaluated QOL of children and adolescents with diabetes type 1 with child and parent reports using both generic and diabetes- related instruments and compared their responses with that of a general, healthy pediatric population coming from the same area. The Greek versions of the Pediatric Quality of Life Inventory 4.0 Generic Core Scales (PedsQL 4.0 GCS) and the Pediatric Quality of Life Inventory 3.0 Type 1 Diabetes Module (PedsQL 3.0 DM) were the instruments applied because the generic as well as the disease-specific instruments provide complementary information when studying HRQOL of a certain population[12]. The following research questions constituted individual

objectives of the study: a) the Greek translation of the Diabetes Module (DM), the pilot study of the Greek Generic Core Scales (GCS) in a sample of healthy and diabetic children and the Greek DM in a sample of children with type 1 diabetes, b) the evaluation of the psychometric properties of these instruments in the population of children and adolescents with type 1 diabetes in Greece, c) the comparison of QOL between Greek children and adolescents with and without diabetes, d) the identification of relationships between QOL in youth with type 1 diabetes and factors that possibly affect it.

Patients and methods

The study participants included 89 children and adolescents who were diagnosed to have type 1 diabetes, their parents and a sample of matched non-diabetic individuals. The age range of the children was 2-18 years old. The children had duration of diabetes type 1 greater than 6 months. Patients with relatively short onset diabetes were selected to capture any major impact of diabetes on QOL. Children with coexisting chronic and psychiatric diseases and those with coexisting acute disease during the study were excluded. The diabetic youths were attending the Diabetes Section of our Pediatrics Department. At the time of the study one hundred and ten children and adolescents up to 18 years old were treated in the Diabetes Section. Ninety-six families were approached and 89 (92.7%) agreed to participate. Patients from families refusing participation did not differ from the participants in terms of age, gender, socioeconomic status, duration of diabetes and glycemic control.

The control group consisted of twenty five children and adolescents who visited the Department for standard check up to get a health certificate in order to attend school activities and sixty four children and adolescents who came from a summer camp for children and adolescents up to 18 years old of Northern Greece. Again children with chronic and psychiatric diseases and those with coexisting acute disease during the study were excluded. The diabetes and control group were matched for age, gender, residence and socioeconomic status.

All families were approached by telephone and an appointment was set either at patient's home or at the next regularly scheduled outpatient visit. In 33% of the cases the questionnaires were sent by ground-mail, along with instructions for independent completion by parents and children and the answers were taken by phone.

Children and parents visiting the Outpatient Department after scheduled 30 minute appointment completed their questionnaires, independently. The diabetes group and their parents completed both the generic and the diabetes instrument. The control group and their parents were only given the generic instrument. Moreover parents completed a form, which included demographic and clinical data. HbA1c analysed by Bayer DCA-2000- was calculated as the mean of the previous year measurements. HbA1c values below 8% were defined as good to moderate metabolic control. Before the collection of information, children gave their assent and parents gave their written consent.

The PedsQL 4.0 GCS consists of four scales divided in 23 items assessing the level of physical and psychosocial functioning of children. Physical functioning consists of 8 items. Psychosocial functioning is divided in three subscales: a) emotional functioning, b) social functioning and c) school functioning (all 5 items). The instructions ask for the degree of a problem each item had been during the previous month. A five point Likert response scale is used (0 = never a problem, 4 = almost always a problem). Items are reverse-scored and linearly transformed to a 0–100 scale, so that higher scores indicate better HRQOL. The total score of a scale is calculated as the average of the individual item responses. There were seven forms available: child-reports for the ages 5–7, 8–12 and 13–18 and parent reports for the ages 2–4, 5–7, 8–12 and 13–18[17]. The GCS had already been translated in Greek by another team. However, in order to use this version for the purposes of a comparative study, a pilot study of the present translation in a sample of healthy and diabetic children had to be undertaken. Also the evaluation of its psychometric properties in the general population of Greek youths had to be done. The GCS has not been field tested in a large sample of Greek children. However, in order to have an idea of the reliability of the GCS in the general population we used the responses of our small control group.

The PedsQL 3.0 DM is the only multidimensional diabetes-specific instrument that would assess the broad age range of 2–18 years with both child and parent proxy-reports[5]. It encompassed five scales: a) diabetes symptoms (11 items), b) treatment barriers (4 items), c) treatment adherence (7 items), d) worry (3 items), and e) communication (3 items). The format, instructions, Likert type response scale, and scoring methods were identical to the GCS. Similar to the PedsQL 4.0 GCS, the PedsQL 3.0 DM in its original US American version showed good internal consistency reliability and construct validity[13]. In order to use DM in a comparative study in Greece, we first had to adapt it to the Greek cultural reality. The first step of this process was the translation of the original instrument into Greek following the steps of the linguistic validation process, and then the pilot study of this translation in a sample of children with diabetes in Greece. The second step was the evaluation of its psychometric properties in the population of Greek diabetic youths.

Cronbach's alpha was used to determine the internal consistency reliability of total scores and subscale scores of the instruments. An internal consistency of 0.70 was set for measures used to detect differences between groups and greater than 0.90 for interpreting individual scores[18]. Construct validity was examined through an analysis of the intercorrelations among Greek GCS Total score and Greek DM scale scores. Concurrent validity was assessed by calculating the intercorrelations between children's and parents' responds. By convention, parent/child intercorrelations were designated as small (0.10–

0.29), medium (0.30– 0.49), and large (>0.50). Referring to the existing literature, the correlations should be at least in the medium effect size range for internalizing problems and in the large effect size range for externalising problems[19].

Statistical analysis was performed with SPSS 12.0 for Windows (SPSS Inc, Chicago, Ill.). In order to assess any relationship between diabetes related QOL and residence, body mass index, metabolic control (HbA1c), type of family, age at onset and duration of diabetes, type of insulin regimen and educational level of the parents, the Pearson correlation coefficient was used. Unpaired t tests were used for comparisons between the scores in the reports of the diabetic and healthy group, males and females with diabetes, those who use two daily injections and those who use the intensive treatment, those who have HbA1c values below and greater than 8%. One-way ANOVA was used for comparisons between different age groups. For all analyses, p value of ≤0.05 was considered to provide statistical significance.

Results

Patient demographic and diabetes- specific data are presented in Table 1 and Table 2.

There was no significant difference between groups as it is shown in Table 1.

Mean chronological age, age at the onset of diabetes and mean duration of the disease were 10.97±3.79, 6.25±4.10 and 4.92±3.87 years respectively. A small proportion (7.9 %) of the diabetic youths lived with one parent, mainly the mother. Twenty eight (34.6%) had two, 51 (63%) three or four daily injections and 2 (2.5%) were on insulin pump. Mean value of HbA1c was 8.00±1.60 %. Although HbA1c values tended to increase, as children grew older we could not find a statistically significant difference between the different age groups and between the genders (p≤0.01).

Cronbach α-coefficient for all subscales and total scores of children and parent proxy reports of Greek versions of PedsQL in Greek children and adolescents are presented in Table 3 and 4. Most child and parent proxy report scales approached or exceeded the reliability standard of 0.70. Correlations between GCS and DM scales are shown (boldface) in Table 5. Subscales of DM correlate positively with the total score of GCS. In table 5, underlined values represent correlations between child and parent proxy reports for both instruments. Parents showed adequate level of concordance with their children and most of the correlation coefficients reached or exceeded 0.50, especially in the DM. All of the above are statistically significant using

Table 1: Demographic characteristics of the diabetic and the control groups

Characteristics		Diabetes Type 1 Group				Control Group			
		N	Rates %	Mean	St. dev.	N	Rates %	Mean	St. dev.
Weight (kg)		87	_	44.12	16.75	88	_	42.31	16.16
Height (cm)		82	_	147.99	21.07	79	_	149.15	17.95
BMI		81	_	19.54	3.55	79	_	18.97	4.40
Age (years)		89	_	10.97	3.79	89	_	10.88	3.57
Age group	2-4 years	5	5.6	3.75	0.96	5	5.6	3.75	0.65
	5-7 years	12	13.5	6.23	0.81	12	13.5	6.30	0.79
	8-12 years	32	39.3	9.38	1.11	32	39.3	9.25	1.02
	13-18 years	40	44.9	14.50	1.89	40	44.9	14.28	1.75
Gender	Females	42	47.2	_	_	42	47.2	_	_
	Males	47	52.8	_	_	47	52.8	_	_
Residence	Capital	29	32.6	_	_	34	38.2	_	_
	City	25	28.1	_	_	21	23.6	_	_
	Town	18	20.2	_	_	17	19.1	_	_
	Village	17	19.1	_	_	17	19.1	_	_
Mother's age (years)		88	_	38.85	6.31	89	_	38.55	5.20
Father's age (years)		85	_	43.68	6.65	89	_	42.52	5.49
Mother's education	Primary	18	20.7	_	_	8	9.0	_	_
	Secondary	27	31.0	_	_	30	33.7	_	_
	Technical	7	8.0	_	_	10	11.2	_	_
	Postsecondary	7	8.0	_	_	7	7.9	_	_
	University	28	32.2	_	_	34	38.2	_	_
Father's education	Primary	11	12.8	_	_	8	90	_	_
	Secondary	23	26.7	_	_	26	29.2	_	_
	Technical	22	25.6	_	_	23	25.8	_	_
	Postsecondary	7	8.1	_	_	3	3.4	_	_
	University	23	26.7	_	_	29	32.6	_	_
Uniparental families		7	7.9	_	_	6	6.7		

N: Number, St. dev.: Standard deviation.

Table 2: Diabetes-specific data of the Diabetes Group

Characteristics	Diabetes Type 1 Group			
	N	Rates %	Mean	St. dev.
HbA1c	81	_	8.00	1.60
Diabetes initiation (years)	87	_	6.25	4.10
Duration of diabetes (years)	88	_	4.92	3.87
Insulin (injections/ day)	81			
Conventional (two)	28	34.6	_	_
Intensive (four)	51	63.0	_	_
Pump	2	2.5	_	_

N: Number, St. dev.: Standard deviation.

Pearson correlation coefficient ($p < 0.01$).

No significant correlation was found between the total score of the diabetic children and BMI, HbA1c, type of family, age at onset and duration of diabetes, insulin therapy, residence and parent education level.

Tables 3 and 4 display the mean, standard deviation and range of item scores of the child and parent proxy Greek GCS and DM in the diabetes sample and control sample respectively. Table 6 demonstrates the comparison between the diabetes and non diabetes sample based on the results of the GCS.

As shown, children and adolescents with diabetes do not differ significantly from their healthy peers on the scales of the generic instrument. The same goes for their parents. The only exception is the "Social functioning" subscale of the child report, where children and adolescents with diabetes report better QOL than their healthy peers (p: 0.04).

We did not find any differences in child GCS report of the diabetes sample among different age and gender groups. Table 7 demonstrates the comparison between QOL reports of Greek male and female diabetic youths based on the DM responds. Boys and girls did not differ in any diabetes related subscale except for the "Communication" subscale where girls reported worse scores than boys (p: 0.05). Different age groups (young children: 5-7 years, children: 8-12 years, adolescents: 13-18 years) reported similar QOL in both generic and diabetes related instrument. The only exception was the "Treatment barriers" subscale of DM where the adolescent group reported worse than the young children group.

Discussion

Cultural adaptation of both instruments in the diabetic population of Greek children was completed by the evaluation of their psychometric properties. The results of this research support the reliability and validity of the Greek versions of PedsQL child self-report and parent proxy-report in Greek children with Diabetes. PedsQL child and parent proxy- report internal consistency reliabilities generally exceeded the recommended minimum coefficient standard of 0.70 for group comparisons. PedsQL 4.0 GCS total score for both children self report and parent proxy-report exceeded 0.70. Therefore the total score of both reports was reliable for comparative studies. In parent proxy reports, all subscale α coefficients exceeded the 0.70 standard and the majority of them reached the 0.90 standard, which is recommended for individual patient analysis. In child reports, only the total score and psychosocial summary score exceeded the 0.70 standard. The

Table 3: Cronbach α coefficients, means, standard deviation (St. dev.) and range of item scores of Greek versions of the Pediatric Quality of Life Inventory 4.0 Generic Core Scales (PedsQL 4.0 GCS) and the Pediatric Quality of Life Inventory 3.0 Type 1 Diabetes Module (PedsQL 3.0 DM) in the diabetes sample of children and adolescents in Northern Greece

			Child self report			**Parent proxy report**
	α	N	Mean. (St. dev /range)	α	N	Mean. (St. dev./range)
PedsQL 4.0 GCS						
Physical health	0.60	84	86.61 (11.81/ 43.75-100.00)	0.87	89	86.91 (15.27/ 43.75-100.00)
Emotional functioning	0.63	84	75.95 (16.01/ 40.00-100.00)	0.89	89	72.30 (17.25/ 30.00-100.00)
Social functioning	0.60	84	85.77 (14.13/ 40.00-100.00)	0.84	89	83.31 (19.51/ 5.00-100.00)
School functioning	0.63	83	78.31 (14.84/ 35.00-100.00)	0.84	86	77.67 (17.17/ 30.00-100.00)
Psychosocial health	0.75	84	82.36 (20.84/ 48.33-100.00)	0.79	89	77.56 (14.62/ 30.00-100.00)
Total score	0.70	84	81.81 (10.69/ 46.74-100.00)	0.87	89	80.60 (13.58/ 36.96-100.00)
PedsQL 3.0 DM						
Diabetes symptoms	0.72	84	70.36 (15.31/ 38.64-100.00)	0.71	89	67.10 (15.09/ 29.54-100.00)
Treatment barriers	0.65	84	74.20 (20.15/ 12.50-100.00)	0.60	89	66.99 (19.48/ 18.75-100.00)
Treatment adherence	0.67	84	82.58 (17.45/ 28.57-100.00)	0.62	89	78.11 (19.33/ 20.83-100.00)
Worries	0.72	84	71.43 (24.04/ 8.33-100.00)	0.72	89	65.31 (23.32/ 0.00-100.00)
Communication	0.74	84	74.90 (25.56/ 0.00-100.00)	0.67	89	70.75 (28.04/ 0.00-100.00)
Total diabetes score	0.75	84	74.06 (13.54/ 41.96-100.00)	0.71	89	69.65 (13.53/ 38.39- 96.43)

N= Number.

Table 4: Cronbach α coefficients, means, standard deviation (St. dev.) and range of item scores of Greek versions of the Pediatric Quality of Life Inventory 4.0 Generic Core Scales (PedsQL 4.0 GCS) in the control sample of children and adolescents in Northern Greece

			Child self report Control group			Parent proxy report Control group
PedsQL 4.0 GCS	α	N	Mean (St. dev. /range)	α	N	Mean. (St. dev. /range)
Physical health	0.86	85	85.40 (12.05/ 56.25-100.00)	0.85	89	85.78 (14.86/ 25.00-100.00)
Emotional functioning	0.82	85	73.94 (16.55/ 20.00-100.00)	0.84	89	72.19 (17.66/ 15.00-100.00)
Social functioning	0.82	85	80.76 (17.12/ 20.00-100.00)	0.81	89	82.58 (15.25/ 45.00-100.00)
School functioning	0.88	85	80.94 (17.87/ 20.00-100.00)	0.85	88	80.11 (18.51/10.00-100.00)
Psychosocial health	0.76	85	78.51 (13.77/ 40.00-100.00)	0.75	89	78.30 (13.56/ 31.67-100.00)
Total score	0.86	85	80.91 (11.83/ 47.83-100.00)	0.85	89	80.87 (12.62/ 43.48-100.00)

N: Number.

emotional, social, and school functioning subscales may be used to examine specific domains of functioning. Until further testing is conducted, scales not achieving 0.70 should be used only for descriptive or exploratory analyses[13]. PedsQL 3.0 DM total score exceeded 0.70 in both children self-reports and parent proxy-reports. Treatment barriers and treatment adherence subscales were in the 0.60 range. The failure of the subscale scores to reach the prerequisite 0.7 of the Cronbach α coefficient may be due to the small number of patients especially in the smaller age groups (<8 years). As Cronbach's internal consistency coefficients represent the lower limit of the actual reliability of a measurement instrument, and a conservative estimate of actual reliability, it is concluded that Greek versions of both instruments are reliable and can be used for the measurement of the quality of life of youths with diabetes and for the conduction of a comparative study with non-diabetic youths in Greece.

PedsQL 4.0 GCS child and parent proxy- report internal consistency reliabilities exceeded the recommended minimum coefficient standard of 0.70 for group comparisons in all subscales and in the total score of the control group. This fact provides indications concerning the reliability of the Greek versions of PedsQL 4.0 Generic Core Scales in the general population of Greek children. However, a greater number of youths - as in a field test- is acquired in order to calculate the reliability of GCS in the general population.

Construct validity of Greek generic and diabetes specific instruments were evaluated using the calculation of the intercorrelations between subscales of both instruments. The results of subscale scores of generic and diabetes specific instruments were correlated with their

Table 5: Correlations between the total scores and the subscales of the Greek versions of the Pediatric Quality of Life Inventory 4.0 Generic Core Scales (PedsQL 4.0 GCS) and the Pediatric Quality of Life Inventory 3.0 Type 1 Diabetes Module (PedsQL 3.0 DM)

	Total score	Physical health	Emotional functioning	Social functioning	School functioning	Total diabetes score	Diabetes symptoms	Treatment barriers	Treatment adherence	Worries	Communication
Total score	0.471	0.781	0.749	0.804	0.670		**0.627**	**0.410**	**0.639**	**0.510**	**0.300**
Physical health		0.482	0.486	0.583	0.296						
Emotional functioning			0.390	0.496	0.388						
Social functioning				0.472	0.422						
School functioning					0.317						
Total diabetes score						0.623	0.747	0.772	0.777	0.563	0.620
Diabetes symptoms							0.550	0.404	0.404	0.252	0.234
Treatment barriers								0.469	0.642	0.396	0.422
Treatment adherence									0.518	0.295	0.425
Worries										0.591	0.317
Communication											0.540

Correlations among GCS and DM scales are in boldface. Underlined values represent correlations between patient report and parent proxy report. All correlations are significant (P≤ 0.01, by 2-tailed Pearson correlation).

Table 6: Comparison of quality of life between the diabetic and the control group

Subscale *Greek Generic Core Scales*	**Comparison of quality of life between the diabetes and non diabetes sample**									
	Diabetes group			Control group			Comparison			
	N	Mean	Standard deviation	N	Mean	Standard deviation	df	t	Mean difference	p
Child report										
Physical health	84	86.61	11.81	85	85.40	12.05	167	0.656	1.21	0.513
Emotional functioning	84	75.95	16.01	85	73.94	16.55	167	0.803	2.01	0.423
Social functioning	84	85.77	14.13	85	80.76	17.12	167	2.075	5.01	0.04*
School functioning	83	78.31	14.84	85	80.94	17.87	166	-	-2.63	0.30
Psychosocial health	84	82.36	20.84	85	78.51	13.77	167	-	3.85	0.157
Total score	84	81.81	10.69	85	80.91	11.83	167	0.523	0.90	0.602
Parent proxy report										
Physical health	89	86.91	15.27	89	85.78	14.86	176	0.506	1.13	0.614
Emotional functioning	89	72.30	17.25	89	72.19	17.66	176	0.042	0.11	0.967
Social functioning	89	83.31	19.51	89	82.58	15.25	176	0.281	0.73	0.779
School functioning	86	77.67	17.17	88	80.11	18.51	172	-0.906	-2.44	0.366
Psychosocial health	89	77.56	14.62	89	78.30	13.56	176	-0.346	-0.73	0.730
Total score	89	80.60	13.58	89	80.87	12.62	176	-0.138	-0.27	0.890

*p ≤0.05.
N: Number.

total scores, respectively. The results from this procedure support the validity of Greek versions of PedsQL 3.0 DM and PedsQL 4.0 GCS for the conduction of HRQOL studies in children with diabetes in Greece. Evaluation of the validity of the integration of generic and diabetes specific instrument was performed through the calculation of the intercorrelations between GCS total score and DM subscales. The results from this procedure support the validity of the integration of the instruments in Greek diabetic children.

Parent – child intercorrelations were also used to support instrument concurrent validity. Children responses correlated positively with parent responses and correlation coefficients were medium to large. Altogether, parents showed a high level of agreement with their children. Consistent with current literature, concordance among parents and children was greater for physical functioning than for emotional and school functioning and more so in DM than GCS[19]. Medium correlation coefficients among children and parents are expected because parent reports, among others, reflect their anxiety for their chronically ill children and underestimate the children's quality of life. This fact confirms the need for simultaneous data collection from parents and children.

Acceptability of PedsQL in the population of children and adolescents with diabetes in Greece was good as the participation was high. Greek versions were easy to complete and both children and parents were capable of giving good quality data about the quality of life. Comparing the results of our study with those of the original US American study, we may conclude that, in this study, the internal consistency reliability coefficients α were smaller in all subscales of the child report of both instruments and in all

Table 7: Comparison between Quality of Life (QOL) reports of Greek boys and girls with diabetes type 1

Subscale *PedsQL 3.0* *Diabetes Module*	**Comparison between QOL reports of Greek boys and girls with diabetes type 1**									
	Boys			Girls			Comparison			
	N	Mean	Standard deviation	N	Mean	Standard deviation	df	t	Mean difference	p
Diabetes symptoms	43	73.13	15.25	41	67.46	15.01	82	1.716	5.67	0.090
Treatment barriers	43	76.60	17.25	41	71.68	22.74	82	1.121	4.92	0.266
Treatment adherence	41	81.48	18.96	41	81.48	18.96	82	0.565	2.16	0.574
Worries	43	74.03	21.53	41	68.70	26.40	82	1.016	5.33	0.312
Communication	43	80.23	24.47	41	69.31	25.78	82	1.993	10.92	0.050*
Total diabetes score	43	76.27	12.90	41	71.75	13.98	82	1.541	4.52	0.127

*p ≤0.05.
N: Number.

subscales of the parent proxy report of the DM. The parent proxy report of the generic instrument had similar α – coefficients with the original instrument. However the above differences were very small and did not minimize the value of the Greek study results. Small differences between children's and parents' reports, and medium correlation coefficients among children and their parents were also observed in the original study[13]. Though not significant, these differences suggested that parents are slightly more sensitive in observing deficits in the HRQOL of their chronically ill children than the children themselves and this is a cross - cultural pattern.

The comparative study between the diabetic and control samples lasted for approximately four months. We found no correlation between diabetes related QOL and age at onset and duration of diabetes, type of family, residence, education of parents, BMI, HbA1c, and type of insulin therapy. In agreement to other studies[1-3,12,13], the Greek diabetic sample reported similar general QOL to a matched control sample originating from the same area. The same results were repeated when the parents reported their estimation of their children's QOL. The above findings may originate from good medical, educational and social services, and from the fact that Greek family continues to be a powerful constitution that overprotects its affected members.

It is surprising that the diabetic youth reported higher scores than their healthy peers in the "Social functioning" subscale. This finding has not been reported elsewhere in the literature. However, considering the fact that the significance is only 0.04 and that the standard deviation of the controls is greater than that of diabetic patients, it may be easily overruled by a larger sample of individuals. Therefore further studies with greater number of subjects (patients and controls) are needed to support this result.

In general, different age groups of the diabetic youth reported similar general and diabetes related QOL. Exception was the "Treatment barriers" subscale of the Greek DM, where the adolescent group reported worse than the young children. The items of this subscale include questions about the feeling of embarrassment when having diabetes, the child- parent conflict over diabetes issues, and the difficulty to follow diabetes care plan. The results may be attributed to the fact that young children do not comprehend the meaning of embarrassment and do not question parent and doctor authenticity. Most studies report that girls with diabetes have worse QOL than boys. Our results found no difference thus supporting the findings of Laffel et al[2] and Delamater et al[14]. Similarly to other studies, no differences were found between youths receiving conventional or intensive insulin treatment[2,9,15] and those having good/moderate (HbA1c <8%) or bad glycemic control (HbA1c ≥8%)[2,3,8,9,13,14,20].

The present study had a few limitations, which may minimally affect the power of its results. A field test of GCS in a large sample of non-diabetic children was not conducted. In order to perform the comparative study, the generic instrument was tested in a small sample of healthy children. Furthermore, only children with diabetes who received specialised care at a single tertiary centre were examined. To evaluate reliability of the instruments, test- retest reliability was not conducted. To test construct validity, the generic instrument was not compared with another similar previously accepted measure in Greece because such a measure for the measurement of HRQOL of children was not available. Finally, factor analysis was not performed.

The management of the children with diabetes improved right at the moment of the beginning of the study. This was the first time that the families were approached in this way. Before the study the only consideration of the families and the doctors was the medical aspects of diabetes and not the quality of life of children. One other important thing is the fact that this research brought the investigating team closer to understanding the families problems and expectations. This of course was a great step towards ameliorating diabetes management of children. We contemplate to use the Greek versions of PedsQL GCS and DM in evaluating quality of life of Greek diabetic children in other settings too.

The present study provided indications concerning the reliability and validity of the Greek versions of PedsQL 4.0 Generic Core Scales and PedsQL 3.0 Diabetes Module. To establish the psychometric properties of the above instruments, one ought to perform test-retest reliability, to correlate the generic instrument with another of the same concept and to perform factor analysis in both instruments. The fact that Greek children with diabetes report similar QOL with children without diabetes is encouraging and supports the option that the Greek family is trying to cope with this demanding and frustrating disease with all its power.

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