

Measuring health-related quality of life in Greek children: psychometric properties of the Greek version of the Pediatric Quality of Life InventoryTM 4.0 Generic Core Scales

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Abstract

Objectives The aim of this study was to investigate the psychometric properties of the Greek version of the Pediatric Quality of Life InventoryTM 4.0 (PedsQLTM 4.0) as a population health outcome measure.

Methods After cultural linguistic validation, a cross-sectional study with the participation of 645 children (8–12 years old) and their primary caregivers was conducted in a nation-wide representative school-based sample to evaluate the psychometric properties of the measure.

Results All PedsQL 4.0 scales showed satisfactory reliability, with Cronbach's α exceeding 0.70—except in self-reported Physical Functioning ($\alpha = 0.65$). Test–retest stability intraclass correlation coefficients (ICCs) were above 0.60 in all subscales. No floor effects were detected in either the self-report or parent proxy versions. Ceiling effects ranged from 2.2% (self-report Total Score) to 31.1% (parent-report Social Functioning). Poor to moderate agreement between self report and proxy report was

observed, especially for the younger age groups of children. Impact of gender, health status, and family affluence status were detected, as hypothesised from previous bibliography, with girls reporting lower health-related quality of life (HRQOL) than boys on the Emotional Functioning subscale, healthy children scoring significantly higher on all scales than those with chronic illnesses, and lower socioeconomic groups scoring significantly lower than higher socioeconomic groups. Factor analysis showed mainly comparable results with the original version.

Conclusions Present results support the reliability and validity of the PedsQL 4.0 Greek version. The instrument could be a valuable tool in HRQOL measurement in school health care settings and population-based studies in Greek-speaking children, though it should be stressed that when possible, the child should be considered the first informant of his/her HRQOL.

Keywords School children · Greece · Health-related quality of life · Pediatric Quality of Life InventoryTM 4.0 · Validity · PedsQLTM

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Introduction

The international literature of paediatric health-related quality of life (HRQOL) in community studies is limited, although available studies do stress the existence of lower well-being among children with health care needs [1–3], among children from low socioeconomic background [4–7] and among girls [8–10], with clear implications to all relevant stakeholders. In Greece, published studies using generic HRQOL scales to assess children's health status at a population level are remarkably limited. One of the main reasons is the limited number of measurement instruments

in Greek that have been developed or adapted against agreed-upon scientific criteria and attributes [11]. As the European interest in preventive and promotional services is expanding, researchers at a national level should be able to choose from a range of types of validated HRQOL instruments, the ones that best fit their research interests in terms of age groups, time constraints for questionnaire completion and, of course, HRQOL domains covered.

In this study, a representative nation-wide sample of 645 children aged between 8 and 12 years and their primary caregivers completed the Greek translation of the Pediatric Quality of Life Inventory™ Generic Core Scales (PedsQL 4.0) [12] to explore its psychometric properties. The PedsQL 4.0 is a generic self-reported HRQOL instrument that has demonstrated to be feasible, reliable and valid as a school and community health measure [1, 2, 4, 13, 14], along with its documented good psychometric properties, in clinical paediatric populations [15–20].

Methods

Procedure

The study was conducted during 2006 in a representative sample of Greek school children. The sampling was random and based on age and gender distribution of school children according to data from the National Census of 2001 living in the 51 geographical sectors of Greece [21]. Schools and school grades were randomly selected in each sector. Students were selected randomly from classroom name lists and were administered the questionnaires with parental informed consent forms to be filled out at home. Three weeks later, retest questionnaires were distributed to a randomly selected 10% of the sample.

Measures

PedsQL 4.0

PedsQL 4.0 is a self-administered paper-and-pencil questionnaire that includes parallel child self-reports (age range 5–18 years) and parent/carer proxy reports (age range 2–18 years) [12]. In our study PedsQL 4.0 Child Self-Report for ages 8–12 and the Parent Proxy Report for ages 8–12 were used. The instrument's 23 items contribute to four subscales: Physical Functioning (PH), Emotional Functioning (EM), Social Functioning (SOC) and School Functioning (SCH). Responses are given on a five-point scale ranging from 0 (never a problem) to 4 (almost always a problem). The instrument translation into Greek followed international guidelines for instrument linguistic validation [22–24], and its procedure is presented elsewhere [25].

HRQOL-influencing factors used for known group validation

The Family Affluence Scale (FAS) [26–28] was used to explore construct validity by means of the known-groups method. The FAS addresses issues of family car ownership, having their own unshared room, the number of computers at home and times the children spent on holiday in the past 12 months. In this study, the FAS was grouped into three groups (low, intermediate and high FAS level). Based on the literature [4–7], it was expected to find lower PedsQL 4.0 scores in children of lower SES. Children with Special Health Care Needs Screener (CSHCN Screener) [29, 30] were included in the parent questionnaire to explore construct validity by means of the known-groups method. The CSHCN contains five question sequences that address the use or need for prescribed medication; medical, mental health or educational services; specialised therapies; functional limitations; and treatment or counselling for emotional or developmental problems. It was expected that children with a chronic condition would display poorer HRQOL [1–3].

Statistical analysis

Test–retest stability and the concordance of self-report and proxy-report scores were evaluated with intraclass correlation coefficients (ICCs) [31]. ICCs ≤ 0.40 indicate poor to fair agreement, 0.41–0.60 moderate agreement, 0.61–0.80 good agreement and > 0.80 excellent agreement [32]. Internal consistency reliability was determined by the calculation of Cronbach's α coefficient. The range of measurement was tested based on the percentages of scores at extremes of the scaling range [33]. The intercorrelations (Pearson's r) of PedsQL 4.0 subscales were explored. Agreement between self-report and proxy-report scores was assessed by Bland–Altman 95% confidence intervals (CI) for limits of agreement (LOA) [34]. LOA provide further information on the magnitude and range of the differences between self-report and proxy-report scores. Paired t tests were used to investigate the extent to which children or parents scored lower on PedsQL 4.0 subscales. Students' t tests were used to detect gender differences or differences between children with and without chronic diseases. To give an indication of the differences between the two groups, effect sizes are also reported. Effect sizes of 0.2–0.5 were considered small, between 0.51 and 0.81 moderate and over 0.8 large. Principal component analysis was applied, and oblique rotation (direct oblimin) examined the structure of relationships between the items of the PedsQL 4.0. Differences on subscales between the socio-economic status groups were determined by the use of

analysis of variance (ANOVA) and Bonferroni correction for multiple testing.

Results

A sample of 800 children and their parents were recruited through primary schools in Greece. A total of 645 self-report and 567 proxy-report questionnaires were returned (i.e. a response rate of 81.8% and 70.9%, respectively). Sociodemographic characteristics are presented in Table 1. No floor effects were detected, whereas ceiling effects ranged from 2.2% for the self-report Total Score to 31.1% for proxy-report SOC score (Table 2). All self-report and proxy-report scales of PedsQL 4.0, except for self-report PH ($\alpha = 0.65$), exceeded the minimum reliability standard of 0.70. Test–retest stability analysis showed ICCs above 0.60 in all subscales ($p < 0.001$) for both self-report and proxy-report scales. Self-report and proxy-report ICCs for PH were 0.75 (95% CI: 0.67–0.85) and 0.76 (95% CI: 0.64–0.84), respectively; for EM 0.61 (95% CI: 0.47–0.77) and 0.77 (95% CI: 0.65–0.84), respectively; for SOC 0.76 (95% CI: 0.64–0.84) and 0.84 (95% CI: 0.76–0.89), respectively; and for SCH 0.83 (95% CI: 0.75–0.89) and 0.88 (95% CI: 0.83–0.92), respectively.

Correlations among self-report subscales and proxy report subscales were all significant and varied from moderate to high (Table 3). Correlations between self-report and proxy report subscales were also significant but lower, with a range from 0.21 to 0.29. The average convergent correlation was equal to 0.24 and greater than the average off-diagonal correlations between self-report and proxy report subscales (equal to 0.17). The ICCs were low

for PH, EM and SOC. Moderate agreement was found for SCH in the total sample and for PH for fifth- to sixth-grade children (Table 4). Parents' scores were significantly higher on PH and EM ($p < 0.001$) but lower on SOC ($p < 0.001$) compared with the corresponding self-report scores. The wide range of LOA as defined by Bland–Altman analysis indicated poor agreement between self-report and proxy report subscales.

Factor analysis resulted in a five-factor solution for both self-report and proxy report, accounting for 50.6% and 64.6% of the total variance, respectively (Table 5). The SCH items split into two different factors, as with the original version. PH items 7 and 8 split into different factors both for self-report and proxy report. Also, item 6 of PH and item 4 of SOC split into different factors for proxy report.

Girls scored significantly lower on EM than did boys (76.7 ± 16.9 vs. 81.0 ± 15.4 , $p = 0.001$). Healthy children scored significantly higher on all self-report and proxy-report scales, even after controlling for gender, age and FAS [analysis of covariance (ANCOVA), $p < 0.01$ for all scales], (Table 6). Effect sizes for all subscales were moderate or large. All subscales except for proxy reports PS, EM and SOC differed across FAS groups, with lower scores for those belonging to low FAS category compared with those belonging to high FAS category (Table 7).

Discussion

Results from this study provide evidence that the instrument can be used in school and community health settings in Greece. Internal consistency reliability exceeded 0.70 in all but one subscale (i.e. self-reported PH $\alpha = 0.65$). Only ceiling effects appeared for self-reported SOC and for parent-reported PH, EM, SOC and SCH, replicating the findings of the original and the translated versions [2, 10, 12–14]. Result of the factor analysis resembled the five-factor structure in the original PedsQL 4.0 version [12]. Exceptions were items 7 and 8 on the PH subscale, which were loading to another factor both for self- and proxy report. It is speculated that these items could also reveal a psychosomatic complaint on behalf of the child. Additionally, item 6 of PH and item 4 of SOC split into different factors for proxy report. An explanation for this could be different parent reasoning for these items (i.e. unwillingness rather than physical constraints to “do chores around the house” and emotional or physical “limitation to do things other peers do”).

The Greek PedsQL 4.0 was able to differentiate between children belonging to groups with a priori expected different levels of HRQOL. The lower scores in children with chronic health care needs reflect their documented

Table 1 Sociodemographic characteristics of sample

	Number	Percent
Total sample	645	
Girls	340	52.7
Boys	305	47.3
School grade		
3rd	148	23.0
4th	171	26.6
5th	167	25.8
6th	159	24.6
Children with Special Health Care Needs screener		
No chronic health needs	619	96
Chronic health needs	26	4.0
Family Affluence Scale		
Low	167	25.9
Middle	309	47.9
High	154	23.8

Table 2 Scale descriptives and Cronbach's α for the Greek version of the Pediatric Quality of Life Inventory™ 4.0

	Number	Mean	Standard deviation	Percent floor	Percent ceiling	Cronbach's α
Self-report						
Total score	645	82.10	11.61	0	2.2	
Physical functioning	644	84.27	12.52	0	9.9	0.65
Psychosocial functioning	642	80.94	12.98	0	3.1	0.83
Emotional functioning	642	78.72	16.37	0	13.6	0.70
Social functioning	639	82.82	16.35	0	18.0	0.73
School functioning	644	81.15	14.95	0.1	10.9	0.72
Parent report						
Total score	564	83.11	13.35	0	7.4	
Physical functioning	567	87.75	14.49	0	29.5	0.83
Psychosocial functioning	563	80.67	14.74	0	9.4	0.84
Emotional functioning	562	82.31	15.72	0	21.7	0.76
Social functioning	560	79.12	20.43	0	31.1	0.71
School functioning	561	80.78	18.89	0	24.4	0.74

Table 3 Intercorrelations of the self-report and parent proxy report for the Greek version of the Pediatric Quality of Life Inventory™ 4.0 scales

	Self-report				Parent proxy report		
	Physical	Emotional	Social	School	Physical	Emotional	Social
Self-report							
Physical functioning							
Emotional functioning	0.54						
Social functioning	0.57	0.55					
School functioning	0.46	0.49	0.48				
Parent proxy report							
Physical functioning	0.21	0.11*	0.19	0.15			
Emotional functioning	0.27	0.22	0.18	0.19	0.47		
Social functioning	0.18	0.12*	0.22	0.13*	0.47	0.41	
School functioning	0.20	0.11*	0.18	0.29	0.51	0.40	0.59

* $p < 0.05$; all other correlations were significant at 0.001

Table 4 Agreement between self-report and parent proxy-report Pediatric Quality of Life Inventory™ 4.0 scales

School grade	Intraclass correlation coefficients (95% CI)			MD (95% CI) ^a	LOA ^b
	3rd–4th	5th–6th	Total		
Physical functioning	0.29 (0.11–0.44)*	0.47 (0.33–0.58)	0.32 (0.2–0.43)	3.49 (–4.09; –2.07)**	(–37.79; 30.81)
Emotional functioning	0.38 (0.22–0.51)	0.32 (0.14–0.46)	0.35 (0.24–0.45)	3.46 (–5.11; –1.81)**	(–43.01; 36.08)
Social functioning	0.33 (0.15–0.47)	0.39 (0.22–0.52)	0.36 (0.24–0.46)	–3.56 (1.62; 5.49)**	(–42.72; 49.84)
School functioning	0.37 (0.20–0.50)	0.45 (0.30–0.57)	0.41 (0.30–0.50)	–0.70 (–1.02; 2.43)	(–40.88; 42.24)

* $p < 0.005$; all other correlations were significant at 0.001 level

** $p < 0.05$ for comparisons using paired t test

^a Mean difference between self- and proxy report (MD)—95% confidence intervals (CI)

^b 95% CI for limits of agreement (LOA) as defined by Bland–Altman method

psychological and social at-risk status [35]. Girls also reported significantly lower levels of emotional well-being that did boys, stressing the socially constructed gender

differences [8–10]. Finally, there was congruence with previous studies [1, 4–7, 36] regarding HRQOL between different socioeconomic categories. In all scales—except

Table 5 Results of the self-report (left loadings) and parent proxy report (right loadings) factor analyses of the Greek version of the Pediatric Quality of Life Inventory™ 4.0

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5					
Physical functioning										
1. It is hard for me to walk more than one block	0.09	0.32	0.65	0.85	-0.02	0.15	0.15	0.23	-0.12	-0.32
2. It is hard for me to run	0.29	0.26	0.62	0.91	-0.10	0.12	0.31	0.15	-0.36	-0.32
3. It is hard for me to do sports activities or exercise	0.17	0.24	0.65	0.90	0.00	0.17	0.44	0.13	-0.39	-0.32
4. It is hard for me to lift something heavy	0.27	0.23	0.42	0.71	-0.30	0.21	0.36	0.26	-0.34	-0.27
5. It is hard for me to take a bath or shower by myself	-0.01	0.27	0.72	0.67	0.05	0.43	0.01	0.05	-0.18	-0.37
6. It is hard for me to do chores around the house	0.30	0.37	0.52	0.41	0.39	0.72	-0.05	0.11	-0.18	-0.31
7. I hurt or ache	0.53	0.63	0.01	0.30	-0.03	0.22	0.45	0.16	-0.41	-0.22
8. I have low energy	0.72	0.59	0.13	0.27	0.04	0.47	0.24	0.25	-0.30	-0.34
Emotional function										
1. I feel afraid or scared	0.72	0.73	0.13	0.18	0.21	0.06	0.21	0.16	-0.36	-0.17
2. I feel sad or blue	0.72	0.77	0.00	0.16	0.22	0.06	0.18	0.30	-0.28	-0.26
3. I feel angry	0.66	0.65	0.13	0.21	0.22	0.23	0.15	0.32	-0.26	-0.33
4. I have trouble sleeping	0.42	0.64	0.23	0.23	0.14	0.04	0.19	0.13	-0.36	-0.16
5. I worry about what will happen to me	0.59	0.78	0.11	0.26	0.15	0.04	0.33	0.14	-0.31	-0.19
Social functioning										
1. I have trouble getting along with other kids	0.37	0.25	0.13	0.37	0.13	-0.01	0.28	0.12	-0.75	-0.89
2. Other kids do not want to be my friend	0.37	-0.45	0.14	0.24	0.24	-0.33	0.17	-0.03	-0.76	0.58
3. Other kids tease me	0.44	-0.51	0.26	0.34	0.10	-0.23	0.11	0.07	-0.59	0.57
4. I cannot do things other kids my age can do	0.40	0.54	0.26	0.44	0.11	-0.19	0.42	0.13	-0.53	0.35
5. It is hard to keep up with my peers	0.15	0.22	0.34	0.46	0.09	0.06	0.23	0.20	-0.74	-0.81
School functioning										
1. It is hard to pay attention in class	0.33	0.26	0.13	0.28	0.72	0.91	0.23	0.20	-0.28	0.13
2. I forget things	0.42	0.52	0.05	0.14	0.52	0.59	0.25	0.22	-0.34	0.07
3. I have trouble keeping up with my schoolwork	0.29	0.22	0.09	0.28	0.66	0.87	0.42	0.21	-0.37	0.18
4. I miss school because of not feeling well	0.31	0.28	0.15	0.23	0.20	0.09	0.73	0.89	-0.24	-0.26
5. I miss school to go to the doctor or hospital	0.22	0.23	0.18	0.24	0.07	0.01	0.81	0.89	-0.21	-0.20

Table 6 Comparison of self-report and parent proxy report of the Pediatric Quality of Life Inventory™ 4.0 scales between chronically ill and healthy children

	Healthy sample			Chronic health condition			Effect size	P value
	Number	Mean	Standard deviation	Number	Mean	Standard deviation		
Self-report								
Total score	619	82.52	11.28	26	71.94	14.60	0.94	<0.001
Physical functioning	618	84.68	12.30	26	74.40	14.06	0.84	<0.001
Psychosocial functioning	617	81.34	12.63	25	70.87	17.02	0.83	<0.001
Emotional functioning	617	79.13	15.91	25	68.60	23.34	0.66	0.002
Social functioning	614	83.30	15.89	25	71.00	22.59	0.77	<0.001
School functioning	618	81.52	14.80	26	72.50	16.26	0.61	0.003
Parent proxy report								
Total score	538	83.66	12.95	26	71.80	16.37	0.92	<0.001
Physical functioning	542	88.19	14.16	25	78.13	18.20	0.71	0.001
Psychosocial functioning	537	81.23	14.41	26	69.19	16.96	0.84	<0.001
Emotional functioning	536	82.80	15.40	26	72.33	18.99	0.68	0.001
Social functioning	534	79.74	20.01	26	66.38	24.89	0.67	0.001
School functioning	535	81.36	18.65	26	68.85	20.02	0.67	0.001

Table 7 The Pediatric Quality of Life Inventory™ 4.0 scale comparison between low, middle and high Family Affluence Scale (FAS) samples

	Low FAS			Middle FAS			High FAS			P value*	P value**		
	A			B			C				A/B	A/C	B/C
	Number	Mean	Standard deviation	Number	Mean	Standard deviation	Number	Mean	Standard deviation				
Self-report													
Total score	167	78.54	13.22	309	82.58	11.11	154	85.20	9.51	<0.001	0.001	0.000	0.059
Physical functioning	167	81.69	14.18	308	84.65	12.48	154	86.83	9.76	0.001	0.039	0.001	0.223
Psychosocial functioning	167	76.86	14.76	308	81.46	12.36	153	84.28	10.93	<0.001	0.001	0.000	0.076
Emotional functioning	167	75.84	17.93	308	79.00	16.12	153	81.47	14.62	0.008	0.133	0.006	0.374
Social functioning	167	78.51	19.37	306	83.25	15.39	152	86.45	13.63	<0.001	0.007	0.000	0.141
School functioning	167	76.23	16.99	309	82.01	14.52	153	84.81	12.11	<0.001	0.000	0.000	0.163
Parent proxy report													
Total score	142	81.43	14.50	272	82.67	13.74	137	85.67	10.81	0.023	1.000	0.024	0.096
Physical functioning	144	85.49	16.18	272	87.46	15.02	138	90.63	10.67	0.010	0.555	0.008	0.106
Psychosocial functioning	142	79.35	15.36	272	80.19	15.12	136	82.97	13.16	0.095	1.000	0.124	0.219
Emotional functioning	141	82.18	15.47	271	81.56	16.66	137	83.66	14.45	0.450	1.000	1.000	0.621
Social functioning	141	77.71	21.42	271	78.71	20.53	135	81.51	19.11	0.269	1.000	0.368	0.580
School functioning	141	78.34	19.24	271	80.48	19.04	136	83.94	17.94	0.045	0.823	0.041	0.244

* Analysis of variance (ANOVA)

** Post hoc analysis with Bonferroni correction for multiple comparison

for proxy report PS, EM and SOC—lower scores were observed in children of lower affluence status.

Our results revealed mainly low correlations between self- and proxy reports of HRQOL. Only scores of the 5th and 6th graders appeared to reach moderate agreement with those of their parents, and then only in terms of physical and school HRQOL. This finding is consistent with previous research revealing that parents and children disagree more on internalising problems such as anxiety or sadness [37, 38]. Besides variations in correlation between parent proxy and child self-reports depending on HRQOL domain, other major factors have been explored, including the child's age, parental report of their own HRQOL, as well as the different statistical procedures followed in analyses [39]. Additionally, a recent qualitative study suggested that the reasons for such child–parent discordance are mainly due to differences between reasoning and differences between response styles [40]. Our findings suggest that the child's self-reported assessment on his/her well-being should be the first-choice source of information.

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