

## Measuring quality of life in children referred for psychiatric problems: Psychometric properties of the PedsQL™ 4.0 generic core scales

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### Abstract

**Objective:** The aim of this study was to assess the psychometric properties of the Dutch translation of the Pediatric Quality of Life Inventory™ (PedsQL™ 4.0) generic core scales and assess its usefulness in measuring quality of life (QoL) in a child psychiatric population. **Methods:** Reliability and validity of the PedsQL were assessed in 310 referred children (ages 6–18 years) and a comparison group consisting of 74 non-referred children (ages 7–18 years), and the parents in both groups. **Results:** Confirmatory factor analysis resulted in a four-factor solution. Internal consistency reliability for the PedsQL Total Scale Score ( $\alpha = 0.84$  child self-report,  $\alpha = 0.87$  parent proxy-report), Psychosocial Health Score ( $\alpha = 0.70$  child self-report,  $\alpha = 0.81$  parent proxy-report), and most subscale scores were acceptable for group comparisons. Correlations between scores of fathers and mothers were large. Criterion-related validity was demonstrated by significantly lower PedsQL scores for referred vs. non-referred children. Significant correlations between PedsQL scales and measures of psychopathology showed convergent validity. Small correlations between PedsQL scales and intelligence of the child evidenced discriminant validity. **Conclusion:** The PedsQL seems a valid instrument in measuring QoL in children referred for psychiatric problems.

**Key words:** Children, PedsQL, Psychiatry, Psychometrics, Quality of life

**Abbreviations:** CBCL – Child behavior checklist/4–18; PedsQL™ 4.0 – Pediatric Quality of Life Inventory™ Version 4.0; QoL – quality of life; YSR – Youth Self-Report

### Introduction

The quality of life (QoL) construct enables translating a person's experience of illness into a quantifiable outcome. Until now most research in child and adolescent populations has focused on chronic *physical diseases* [1, 2]. The few studies that have focussed on QoL of children with psychiatric disorders [3–5] found a poorer QoL in this patient group compared to children with chronic physical disorders or healthy child populations.

In our search for an instrument to measure QoL in children with psychiatric disorders the Pediatric Quality of Life Inventory™ version 4.0 (PedsQL [6]) seemed most suitable. Its generic part encompasses the core health dimensions formulated by the WHO [7], it is well validated, and has proven its usefulness for measuring QoL of children with different diseases. The aim of this study was to assess the psychometric properties of the Dutch translation of the PedsQL and assess its usefulness in measuring QoL in a child psychiatric

population. We focussed on the parent and child forms for ages 5–7, 8–12, and 13–18 years.

## Methods

### *Procedure and participants*

The patient sample consisted of 310 children who had been referred to an outpatient mental health clinic (response 73.1%; mean age 11.3 years (SD = 3.18; range 6–18.2 years); boys 59.7; 33.2% low, 30.0% medium, and 36.8% high socio economic status (SES) families). For 293 (94.5%) children both child and parent reports were available. For 3 (1.0%) only child self-report, and for 14 (4.5%) only parent proxy-report was available. For all analyses except the interparent agreement, information of one parent was used (89.9% mothers).

The comparison group consisted of 74 children from the general population (response 66.1%), who had not visited mental health services in the past year (mean age 12.1 years (SD = 3.18; range 7.4–18.2 years); 56.8% boys; 17.6% low, 51.3% medium, and 31.1% high SES families). For 69 (93.2%) children both child and parent report were available, for one (1.4%) child only child self-report, and for four (5.4%) children only parent

proxy-report. Mother was main parental informant (91.8%).

### *Instruments*

The PedsQL [6, 8] generic core scale consists of 23 items and has a child self-report and parallel parent proxy-report format for ages 5–7, 8–12, and 13–18 years, which can be self-administered except the ages 5–7-child self-report, which has an interview format. The items are scored on a five-point Likert-scale, ranging from ‘never a problem’ to ‘almost always a problem’ (corresponding scores 100, 75, 50, 25 or 0). The child self-report ages 5–7 is simplified into a three-point scale (100, 50 or 0). A higher PedsQL score indicates a better QoL. Four subscales can be computed: (1) physical (eight items), (2) emotional (five items), (3) social (five items), and (4) school functioning (five items), as well as a psychosocial health summary score (15 items; composed of the emotional, social and school functioning subscales) and a total scale score. Scale scores are computed as the sum of the itemscores divided by the number of items answered. Good validity has been documented [6, 8]. The PedsQL was translated into Dutch by two authors (DB, HMK) independently and translated back into English

**Table 1.** Scale descriptives and internal consistency reliability for PedsQL child self-report and parent proxy-report (patient sample only)

Scale	Scale descriptives						Internal consistency reliability			
	Number of items	N	Mean	SD	Minimum	Maximum	Total sample	Ages 6–7	Ages 8–12	Ages 13–18
Child self-report										
Total score	23	296	72.2	12.7	35.8	100.0	0.84	0.73	0.85	0.87
Physical functioning	8	296	81.2	14.2	31.2	100.0	0.70	0.44	0.73	0.79
Psychosocial health	15	296	67.4	14.7	23.3	100.0	0.81	0.70	0.82	0.84
Emotional functioning	5	296	61.3	19.5	15.0	100.0	0.66	0.43	0.63	0.80
Social functioning	5	296	73.0	20.4	0.0	100.0	0.75	0.63	0.72	0.78
School functioning	5	296	67.9	16.7	15.0	100.0	0.59	0.40	0.66	0.57
Parent proxy-report										
Total score	23	307	66.9	14.0	27.1	97.8	0.87	0.86	0.84	0.91
Physical functioning	8	307	80.0	17.7	21.8	100.0	0.81	0.82	0.78	0.85
Psychosocial health	15	307	59.9	15.3	21.6	96.6	0.83	0.83	0.80	0.87
Emotional functioning	5	306	54.4	18.7	5.0	100.0	0.73	0.76	0.67	0.78
Social functioning	5	307	63.3	22.9	5.0	100.0	0.85	0.81	0.84	0.86
School functioning	5	301	62.4	18.2	15.0	100.0	0.69	0.69	0.63	0.78

by two bilingual translators. After review and comments by the PedsQL Project team this resulted in the final Dutch version.

The *Child Behavior Checklist/4-18* (CBCL [9]) and the *Youth Self-Report* (YSR [10]) were used to obtain standardized parent and child reports of children's problem behavior. A Total Problem, Internalizing and Externalizing score can be computed: the higher the score, the greater the problems. Intelligence was measured using the Wechsler Intelligence Scale for Children – Revised

(WISC-R [11, 12]). In 13.9% of the children this was not possible.

#### Statistical analyses

Internal consistency was determined by means of Cronbach's  $\alpha$  coefficients [13]. Factor structure was examined by multitrait-multimethod (MTMM) analysis of subscales and a confirmatory factor analysis (CFA) of items, using the M-plus software [14]. We tested Varni's four-factor model

**Table 2.** Factor loadings of items on subscales and of subscales on Psychosocial Health, percentage explained variance and fit indices reported for child and parent report.

Scale/item	Child self-report				Parent proxy-report			
	Total sample N = 343	Ages 6-7 N = 57	Ages 8-12 N = 174	Ages 13-18 N = 112	Total sample N = 339	Ages 6-7 N = 56	Ages 8-12 N = 176	Ages 13-18 N = 107
<b>Physical Functioning</b>								
Hard to walk more than a block	0.643	0.644	0.710	0.660	0.832	0.780	0.865	0.951
Hard to run	0.574	0.726	0.565	0.710	0.803	0.663	0.838	0.824
Hard to do sports or exercises	0.659	0.341	0.645	0.865	0.796	0.645	0.810	0.855
Hard to lift something heavy	0.588	0.313	0.665	0.627	0.772	0.797	0.743	0.842
Hard to take a bath or shower	0.441	0.349	0.517	0.112	0.615	0.686	0.610	0.585
Hard to do chores around house	0.513	0.084	0.603	0.453	0.630	0.659	0.616	0.631
Hurt or ache	0.614	0.388	0.576	0.773	0.714	0.638	0.629	0.861
Low energy	0.659	0.407	0.644	0.832	0.768	0.717	0.760	0.882
<b>Emotional functioning</b>	(0.868)*	(0.563)*	(0.929)*	(0.840)*	(0.810)*	(0.751)*	(0.800)*	(0.861)*
Feel afraid or scared	0.690	0.840	0.639	0.877	0.711	0.589	0.685	0.782
Feel sad or blue	0.692	0.502	0.636	0.852	0.816	0.835	0.786	0.855
Feel angry	0.635	0.739	0.565	0.736	0.750	0.752	0.753	0.709
Trouble sleeping	0.596	0.098	0.567	0.799	0.652	0.662	0.561	0.814
Worry about what will happen	0.560	0.439	0.603	0.615	0.803	0.906	0.801	0.791
<b>Social functioning</b>	(0.781)*	(0.919)*	(0.840)*	(0.728)*	(0.762)*	(0.900)*	(0.738)*	(0.765)*
Trouble getting along with peers	0.717	0.762	0.658	0.801	0.889	0.841	0.901	0.878
Other kids not wanting to be friends	0.694	0.597	0.629	0.765	0.888	0.893	0.912	0.856
Teased	0.713	0.467	0.707	0.804	0.777	0.792	0.755	0.789
Doing things other peers do	0.602	0.462	0.643	0.554	0.724	0.595	0.660	0.855
Hard to keep up when play with others	0.772	0.772	0.706	0.881	0.874	0.772	0.855	0.923
<b>School functioning</b>	(0.816)*	(0.801)*	(0.866)*	(0.810)*	(0.784)*	(0.703)*	(0.774)*	(0.833)*
Hard to concentrate	0.620	0.733	0.593	0.751	0.798	0.836	0.814	0.753
Forget things	0.622	0.413	0.718	0.538	0.712	0.811	0.634	0.728
Trouble keeping up with schoolwork	0.647	0.781	0.593	0.650	0.770	0.696	0.770	0.873
Miss school – not well	0.475	0.160	0.537	0.678	0.670	0.689	0.622	0.819
Miss school – doctor appointment	0.481	0.447	0.558	0.312	0.651	0.541	0.714	0.685
Percentage explained variance	43.85	29.64	38.83	49.70	58.38	53.00	56.22	65.74
RMSEA	0.075	0.154	0.083	0.091	0.116	0.125	0.115	0.116
CFI	0.891	0.535	0.894	0.937	0.887	0.916	0.883	0.944
TLI	0.927	0.550	0.923	0.952	0.945	0.929	0.926	0.971

Note: Analyses were performed on the combined patient and comparison samples.

\* Factor loading of subscale on higher-order factor psychosocial health.

[6], consisting of a physical, emotional, social, and school functioning factor, and included the higher-order psychosocial health factor. As fit indices were used: Root Mean Square Error of Approximation (RMSEA [15]), Tucker Lewis Index (TLI) and the Comparative Fit Index (CFI [16]). Values indicating adequate fit are RMSEA 0.03–0.08, TLI 0.90–1.00, and CFI 0.90–1.00. Interparent agreement was assessed using intra-class correlations (ICC). To test criterion-related validity, scores of patient and comparison group were compared in an Analysis of Covariance (ANCOVA) using age, sex and SES as covariates. Construct validity was assessed through PedsQL correlations with indicators of psychopathology and intelligence.

## Results

Mean scale scores and Cronbach's  $\alpha$ s are shown in Table 1. Child self-report ages 6–7 years had low  $\alpha$ s for subscales (0.40–0.63); versions 8–12 and 13–18 years had much better alphas. Parent versions for different age groups had alphas  $\geq 0.70$  for almost all subscales. The factor structure was strongly replicated (Table 2), and explained for the total sample 44% of the variance in child and 58% in parent report. All fit indices of child report fell in the acceptable range [15, 16] except for children ages 6–7 years; in parent report RMSEA was slightly too high. In the MTMM analysis all monotrait-multimethod correlations were significant ( $p < 0.01$ ; Table 3) and all MTMM

correlations were smaller than the monotrait-multimethod correlations. Of the correlation coefficients between dissimilar scales within the same informant (multitrait-monomethod) 46% exceeded the monotrait-multimethod correlations. Child and parent report total scores correlated 0.38 for ages 6–12 and 0.51 for ages 13–18 years. Father and mother completed the PedsQL independently for 190 (61.3%) children (mean interval 8.9 days). All ICC's were  $>0.70$  and significant ( $p < 0.01$ ; Table 4). Mothers' and fathers' scores differed significantly on psychosocial health and social functioning in age group 6–7 years ( $t$ -test;  $p < 0.05$ ).

Corrected for SES, sex, and age effects, all scale scores were higher for non-referred than referred children at  $p < 0.001$  in both child and parent report (Table 5). All effect sizes for referral were small to medium in child self-report (range 4–12%; cf. [17]) and large in parent proxy-report (range 9–27%) except for physical functioning. Just one two-way interaction was statistically significant (referral status  $\times$  age;  $p < 0.05$ ) with younger referred children scoring lower on the social functioning scale of the child self-report (effect size 2%). Convergent validity was assessed by computing Pearson correlations between PedsQL child and parent report and indicators of psychopathology (Table 6). All PedsQL child self-report scales except school functioning had significantly larger correlations with YSR internalizing than externalizing scores ( $p$  at least  $<0.05$ ; Williams' formula [18]). In parent questionnaires, physical

**Table 3.** MTMM intercorrelations between and among PedsQL subscales (patient sample only)

Scale	Child self-report				Parent proxy-report			
	Physical	Emotional	Social	School	Physical	Emotional	Social	School
Child report								
Physical functioning		0.38*	0.33*	0.33*	<i>0.34*</i>	0.12	0.14	0.13
Emotional functioning	0.41*		0.41*	0.39*	0.11	<i>0.32*</i>	0.09	0.11
Social functioning	0.51*	0.42*		0.48*	0.21*	0.12	<i>0.47*</i>	0.10
School functioning	0.34*	0.52*	0.30*		0.17**	0.14**	0.20*	<i>0.35*</i>
Parent report								
Physical functioning	<i>0.42*</i>	0.32*	0.28*	0.32*		0.24*	0.31*	0.33*
Emotional functioning	0.29*	<i>0.53*</i>	0.26**	0.37*	0.57*		0.31*	0.30*
Social functioning	0.29*	0.10	<i>0.45*</i>	0.24**	0.50*	0.42*		0.36*
School functioning	0.17	0.28*	0.13	<i>0.44*</i>	0.57*	0.50*	0.49*	

Note: Age group 6–12 years above and age group 13–18 years below diagonal. Monotrait-multimethod correlations are in italics.  
\*Correlation significant at  $p < 0.01$ ; \*\*Correlation significant at  $p < 0.05$ .

**Table 4.** Interparent agreement on PedsQL scale scores (patient sample only)

Scale	Ages 6–7 N = 37	Ages 8–12 N = 98	Ages 13–18 N = 55
Total score	0.88	0.78	0.88
Physical functioning	0.80	0.80	0.82
Psychosocial health	0.89 <sup>a</sup>	0.77	0.86
Emotional functioning	0.86	0.77	0.85
Social functioning	0.91 <sup>b</sup>	0.88	0.82
School functioning	0.84	0.80	0.89

Note: All intra class correlation coefficients were significant at  $p < 0.01$ .

<sup>a</sup> Mothers scored lower than fathers at  $p < 0.05$ .

<sup>b</sup> Mothers scored lower than fathers at  $p < 0.01$ .

and emotional functioning of the PedsQL had significantly larger correlations with CBCL internalizing than externalizing scores ( $p < 0.05$ ; Williams' formula [18]). All correlations between PedsQL child self-report scales and CBCL parent proxy-report scales were small [17]; correlations between PedsQL parent proxy-report scales and YSR child self-report scales were small to medium [17]. The assessment of discriminant validity

showed no significant correlation between PedsQL child and parent report and the child's intelligence, except for school functioning in child self-report ( $r = 0.17$ ;  $p < 0.01$ ).

## Discussion

This article described the psychometric properties of the Dutch translation of the PedsQL when applied to children referred for psychiatric problems. Since no fit indices were found for improvement of the model, we accept the four-factor model as the measurement model of the Dutch PedsQL at least for 8–18 year olds. Almost all scales had Cronbach's  $\alpha$ s sufficient for group comparisons ( $\geq 0.70$ ; [19]), except child report for ages 6–7 years. Varni et al. [6] found similar alpha values, but higher  $\alpha$  values for the younger age group. The findings of the CFA and MTMM analyses support the use of the same scale constructs for both child and parent informants. All correlations between PedsQL scale scores of fathers and mothers exceeded the mean correlation of 0.60 found in a large meta-analysis on cross-informant agreement [20].

**Table 5.** Mean scale scores and percentages of explained variance accounted for by significant effects of referral status, sex and age in scale scores for referred and non-referred children

Scale	Mean (SD)		Percentage of explained variance			
	Referred	Non-referred	Referral <sup>a</sup>	Sex <sup>b</sup>	Age <sup>c</sup>	SES <sup>d</sup>
Child self-report						
Total score	72.2 (12.7)	84.2 (10.4)	11	1	1	
Physical functioning	81.2 (14.2)	88.8 (9.7)	4			
Psychosocial health	67.4 (14.7)	81.7 (12.1)	12		1	
Emotional functioning	61.3 (19.5)	78.0 (17.3)	10	3	2	
Social functioning	73.0 (20.4)	86.0 (13.4)	5		2	1
School functioning	67.9 (16.7)	81.4 (13.0)	9			
Parent proxy-report						
Total score	66.9 (14.0)	87.6 (11.0)	24		1	
Physical functioning	80.0 (17.7)	93.2 (9.1)	9			
Psychosocial health	59.9 (15.3)	84.6 (13.2)	27		2	
Emotional functioning	54.4 (18.7)	81.1 (17.4)	23		2	
Social functioning	63.3 (22.9)	90.3 (14.0)	16		2	
School functioning	62.4 (18.2)	82.5 (16.3)	16			

<sup>a</sup> All scores were higher for non-referred than referred children at  $p < 0.001$ .

<sup>b</sup> Boys scored higher than girls on total score at  $p < 0.05$  and on emotional functioning at  $p < 0.01$ .

<sup>c</sup> Older children scored higher than younger children at  $p < 0.05$ ; except emotional functioning on child report and social functioning on both child and parent report, where scores differed at  $p < 0.01$ .

<sup>d</sup> Children with a high SES scored higher than children with a low SES at  $p < 0.05$ .

**Table 6.** Pearson correlations between PedsQL child and parent report and indicators of psychopathology, and intelligence (patient sample only)

PedsQL scale	YSR N = 136			CBCL N = 305			Intelligence N = 265
	Total score	Externalizing	Internalizing	Total score	Externalizing	Internalizing	
Total score							
Child	-0.73	-0.42	-0.68	-0.24	-0.11 <sup>a</sup>	-0.23	0.09 <sup>a</sup>
Parent	-0.39	-0.29	-0.40	-0.62	-0.43	-0.51	0.05 <sup>a</sup>
Physical functioning							
Child	-0.42	-0.22 <sup>b</sup>	-0.40	-0.14 <sup>b</sup>	-0.02 <sup>a</sup>	-0.21	0.01 <sup>a</sup>
Parent	-0.27	-0.18 <sup>b</sup>	-0.34	-0.39	-0.26	-0.38	0.02 <sup>a</sup>
Psychosocial health							
Child	-0.76	-0.45	-0.71	-0.24	-0.16	-0.19	0.12 <sup>a</sup>
Parent	-0.40	-0.31	-0.36	-0.63	-0.45	-0.49	0.06 <sup>a</sup>
Emotional functioning							
Child	-0.68	-0.36	-0.72	-0.14 <sup>b</sup>	-0.03 <sup>a</sup>	-0.20	0.05 <sup>a</sup>
Parent	-0.42	-0.27	-0.43	-0.51	-0.28	-0.56	-0.03 <sup>a</sup>
Social functioning							
Child	-0.53	-0.28	-0.46	-0.21	-0.17	-0.11 <sup>a</sup>	0.07 <sup>a</sup>
Parent	-0.29	-0.20 <sup>b</sup>	-0.23	-0.52	-0.42	-0.31	0.06 <sup>a</sup>
School functioning							
Child	-0.53	-0.40	-0.43	-0.20	-0.16	-0.13 <sup>b</sup>	0.17
Parent	-0.27	-0.29	-0.23	-0.40	-0.32	-0.26	0.11 <sup>a</sup>

Note: All correlations were significant at  $p < 0.01$  except those marked with <sup>a</sup> or <sup>b</sup>.

<sup>a</sup> Correlation not significant.

<sup>b</sup> Correlation significant at  $p < 0.05$ .

Significantly lower mean PedsQL scores for referred vs. non-referred children evidenced criterion-related validity. Compared to the healthy sample of Varni et al. [6] our psychiatric group also had lower scores on all PedsQL scales, but a similar level of QoL compared to children with cancer [21] or rheumatic diseases [22]. These findings suggest that the impact of having a psychiatric problem on QoL is at least as large as the impact of having a chronic physical disorder. Significant correlations between PedsQL scales and measures of psychopathology showed convergent validity. Small and mostly non-significant correlations between PedsQL scales and intelligence of the child evidenced discriminant validity.

Based on the results from this study we conclude that the PedsQL is a useful instrument in measuring QoL in children referred for psychiatric problems. Its reliability and validity are satisfactory, although the use in younger children (ages 6–7) with psychiatric problems needs further research. Since we were not able to include children aged 5 years, the Dutch PedsQL is only validated for children aged 6 years and older.

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