

Development and Psychometric Evaluation of a Catalan Self- and Interviewer-Administered Version of the Pediatric Quality of Life InventoryTM Version 4.0

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Objective The purposes of this study were to develop and to assess the psychometric properties of a Catalan self- and interviewer-administered version of the Pediatric Quality of Life Inventory Generic Core Scales (PedsQL) with a sample of schoolchildren, and to examine the equivalence between both versions. **Methods** 511 schoolchildren aged between 9 and 17 years old participated in the study. In addition to completing a Catalan self-administered version of the PedsQL, each child was interviewed individually. **Results** Confirmatory factor analysis did not support the original Varni's proposal. Instead, a short 12-item version was derived. The higher-order scales for both versions were internally consistent. Moreover, relationships between ratings of children's quality of life were generally significant; both versions were also found to be related with another measure of quality of life supporting their validity. **Conclusions** A new administration form for the PedsQL is presented in this study. The psychometric properties of both self- and interviewer-administered short 12-item versions are reassuring albeit with a few areas of improvement. Further studies are needed to investigate whether self- and interviewer-administered versions can really be considered to be comparable.

Key words interviewer- administered version; pediatric quality of life inventory generic core scales; quality of life; self-administered version.

Introduction

Many different instruments are available for measuring health-related quality of life in children (see Creemens, Eiser, & Blades, 2006a; Davis et al., 2006; Eiser & Morse, 2001; Harding, 2001 for some recent reviews). Among them, the Pediatric Quality of Life Inventory Generic Core Scales (PedsQL; Varni, Seid, & Kurtin, 2001) is one of the most frequently used instruments (Clarke & Eiser, 2004; Rajmil et al., 2004a) and it has been strongly recommended in many reports (McGrath et al., in press; Wallander, Schmitt, & Koot, 2001). This is hardly surprising since it is claimed to have many of the positive features that experts believe a high-quality instrument must possess (Eiser & Morse, 2001; Matza, Swensen, Flood, Secnik, & Leidy, 2004): namely, (a) appropriateness of the conceptual and measurement model (Varni, Burwinkle, & Seid, 2005); (b) reliability (Varni et al., 2003; Varni, Burwinkle,

& Seid, 2006), (c) validity (Varni et al., 2003, 2006), (d) responsiveness (Varni, Seid, Kurtin, Uzark, & Szer, 2002), (e) feasibility (Varni et al., 2003, 2006), (f) availability of alternative forms (i.e., child self-report and parent proxy reports) (Creemens, Eiser, & Blades, 2006b), (g) availability and equivalence of cultural and language adaptations (Chan et al. 2005; Felder-Puig et al. 2004; Reinfjell, Diseth, Veenstra, & Vikan, 2006; Upton et al. 2005), and (h) interpretability, precision, and respondent and administrator acceptability (Varni et al., 2001, 2005) (Fitzpatrick, Darey, Buxton, & Jones, 1998; Scientific Advisor Committee of the Medical Outcome Trust, 2002). The PedsQL 4.0 is a brief general measure of quality of life which covers four areas of interest: the physical, emotional, and social functioning of the child, which are the key components of health as defined by the World Health Organization (1948), and the child's

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Journal of Pediatric Psychology 33(1) pp. 63–79, 2008

doi:10.1093/jpepsy/jsm040

Advance Access publication June 14, 2007

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school functioning. Disease-specific modules, which focus on specific issues of certain illnesses, are available that can be administered along with the PedsQL (i.e., asthma, cancer, cerebral palsy, brain tumor, fatigue, cardiac problems, rheumatology problems). A child self-report form, and a parent proxy parallel report form, appropriate to the child's age, are also available. So far, 122 papers have been published on the use of this generic instrument (see www.pedsq.org for a complete list of PedsQL publications). The PedsQL has been mostly used to describe the quality of life of children suffering from various illnesses (e.g. diabetes mellitus, extreme obesity, cancer, etc.) and to study the factors associated with the quality of life of these populations (Appendix 1). The PedsQL is translated into many languages. However, there are only four papers published which investigate the adequacy of the psychometric properties of these translations (i.e., Norwegian, Chinese, UK-English, and German versions).

The PedsQL was created as a self-administered instrument. However, it would be beneficial to have this measure available in other formats such as in personal interviewer format, to be applied to children who are unable to understand written questions, to reduce the burden of readability, or to be applied when children are too fatigued, too ill, or too young to complete the questionnaire by their own (Matza et al., 2004). In all these circumstances, unless an interview format is implemented to complete the PedsQL, the information about the child's quality of life must be limited to what the parents/caregivers say. However, it has been extensively documented that parent-proxy reports of children's quality of life may be different from the children's self-reports of quality of life (Creemens et al., 2006b; Theunissen et al., 1998). Thus, the information provided by the interview might be fundamental to complement the parent-proxy reports. Nevertheless, and although this alternative mode of administering the PedsQL has already been used [i.e., Palmer, Meeske, Katz, Burwinkle, & Varni, (in press) used this mode only in a few cases who were not capable of completing the self-administered questionnaire], no data has been made available about the psychometric properties of the PedsQL when administered in this way.

The purpose of this study was 2-fold. The first purpose was to describe the development of a self-administered and an interviewer-administered version of the PedsQL in Catalan.¹ These versions were

administered to a sample of school children. From these data, the internal structure of both versions was investigated. It was expected that both versions would have four factors corresponding to their four scales (i.e., physical, emotional, social, and school functioning) and two higher-order factors (i.e. physical and psychosocial health summary). Reliability and validity of both versions were also examined. Given the inevitable differences when health is assessed from the parents' and children's perspectives, the validation against subjective measures was mainly based on information collected from children. Specifically, we hypothesized that both versions would allow us to differentiate healthy children from children with any medically identified illness, children who had suffered from any minor illness in the month previous to the assessment, and/or children who suffered from chronic pain (*construct validity*). Both versions would also correlate with another established measure of quality of life (*convergent validity*), and they would correlate with measures of children's functioning and indicators of interference of the children's health status on parents' daily routines (*predictive validity*). The second purpose was to provide some preliminary data about the concordance between these two Catalan versions after being validated.

Method

Participants

A representative sample of schoolchildren in grades 4–11 in Tarragona (a province of Catalonia, Spain) were invited to participate in this study ($N=902$). They were recruited from nonspecial primary and secondary schools. Exclusion criteria for the study were as follows: (a) the child had a cognitive impairment, and (b) the family was illiterate or unable to understand Catalan. Of the total sample invited, 511 decided to participate (61.09% child participation rate). The parents of 449 of these children were also involved (49.78% parent participation rate). The participating children did not differ from the eligible children who were invited but did not participate on school grade or sex. The age of the participating children age ranged from 9 to 17 years (mean age = 11.73; $SD = 1.93$) and 51.7% of the sample were males. Table I presents the relevant socio-demographic and medical data of the participating schoolchildren.

Procedure

The protocol followed was reviewed and approved by the Department of Education of the Government of Catalonia, and by the boards of the participating schools.

¹Catalan is a language spoken by well over 10 million people in eastern Spain, south-western France, and the Island of Sardinia (located in the middle of the western Mediterranean).

Table I. Characteristics of the Children and Adolescents

	Scale range	Total sample mean (SD)
Socio-demographic data		
Age (years)	9–17	11.73 (1.93)
Gender (% , N)		
Boys	–	51.7 (264)
Girls	–	48.3 (247)
SES ^a (% , N)		
High	–	40.1 (180)
Medium	–	32.2 (145)
Low	–	27.6 (124)
Medical history		
Number of hospitalizations in their lives ^b (% , N)		
0	–	59.7 (259)
1	–	28.3 (123)
2	–	8.3 (36)
3	–	2.1 (9)
4	–	1.2 (5)
5	–	0.5 (2)
Number of surgical procedures in their lives ^c (% , N)		
0	–	75.9 (334)
1	–	19.1 (85)
2	–	3.6 (16)
3	–	1.1 (5)
4	–	0.2 (1)
Current general health status		
Medical diagnosis ^d (% of the total sample, N)		
Diabetes	–	0.7 (3)
Allergy	–	13.2 (58)
Asthma	–	3.2 (14)
Cardiology problems	–	2.3 (10)
Psychiatric/psychological problems	–	1.1 (5)
Others	–	5.2 (23)
Number of visits to healthcare professional during the preceding year ^e (% , N)		
0–2	–	62.3 (225)
3–5	–	29.9 (108)
6–10	–	5.8 (21)
>10	–	2.1 (7)

^aInformation missing in 62 cases.

^bInformation missing in 77 cases.

^cInformation missing in 130 cases.

^dInformation missing in 72 cases.

^eInformation missing in 150 cases.

A total of 40 classes from grades 4 through 11 of 20 primary and secondary schools were randomly selected using a stratified sampling procedure from all eligible nonspecial education schools in Tarragona. All the schools approached agreed to participate, except for one

which was involved in several other research projects at the time. After the schools had given their agreement, all children attending these classes and their parents were invited to participate. The parents were sent a letter in which they and their children were asked to participate. Children whose parents provided them with informed consent were individually interviewed by two female interviewers at their school; they were asked to provide information about various domains of their health status and about the impact of their health status on their daily life.

Because the interview was concerned with past experiences (i.e., children were requested to recall their pain experiences over the 3 months before the interview and they were also asked to make judgment about their quality of life in the month previous to the interview), memory enhancing techniques were used (Orbach & Lamb, 2000). For example, interviewers used open-ended questions, and important events as end point times, in order to prevent interviewer bias from affecting children's reports, and to increase the accuracy of the information. Several other quality control measures were implemented during data collection. First, the interviewers attended standardization courses in which they were instructed and trained on how to conduct the interview. Second, data sheets were carefully checked immediately after the interviews, and further monitored centrally to check for missing data or inconsistencies.

The parents of the participating children were surveyed separately. They were requested to provide some additional socio-demographic data (see below), and information about the child's health status.

Linguistic Validation of the PedsQL™ 4.0

A Catalan version of the PedsQL (Varni et al., 2001) was developed using a back-translation procedure according to the guidelines suggested by the Mapi Research Institute (2002) and Dr J. W. Varni. First, two native Catalan psychologists who had a good command of English translated the questionnaire into Catalan. Then, a professional translator, who was not familiar with the original version of the questionnaire, back-translated this Catalan version into English. Then, the new English version (back-translated version) was sent to the questionnaire's author to check whether the back-translation was appropriate (i.e., whether it preserved the denotation and connotation of the original). Some minor changes were made in the Catalan version following the recommendations of the author, to solve slight discrepancies between the back-translated English version and

the original. Then this second version was tested on a sample of 10 children.

An interviewer-version of the Catalan version of the PedsQL was also created. Because consistent wording between modes can lead to inconsistent administration if the questions are not easy to administer in the given mode, the original statements of the self-administered version were formulated as questions (i.e., questions that were developed to be read by the respondent were changed to questions that would be heard by the respondent). After being translated by a professional translator, this new version was sent to Dr Varni for his approval.

Both versions of the PedsQL™ 4.0 were answered by all the participants with one day between administrations, in order to avoid memory bias as much as possible. Thus, the same participants completed both self-administered and interviewer-administered versions. The order of administration of both versions was randomized to eliminate the order effect.

Measures

Socio-demographic Measures

Information about age, gender, and school grade was collected at the time of interview. Based on the work of Domingo-Salvany et al. (2000) on the measurement of socio-economic status, the highest occupation of the two parents was the one used to rate the socio-economic status (SES) of the family and the child.

Quality of Life

The PedsQL (Varni et al., 2001) was used to assess the children's perception of their quality of life. The PedsQL is a 23-item generic instrument that encompasses four multidimensional scales (physical, emotional, social, and school functioning) and three summary scales (total, physical health summary, psychosocial health summary). Developmentally appropriate versions (i.e., ages 8–12 and 13–18) were used. The child was asked how much of a problem each item had been in the past month. Items were scored on a 5-point Likert scale, from 0 (never a problem) to 4 (almost always a problem). Items were reverse-scored and linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0), so that higher scores indicated a better quality of life. The feasibility, reliability, and validity of the instrument against, for example, different health conditions have been demonstrated in both clinical and school populations (Varni et al., 2001, 2006).

The Questionnaire for measuring the health-related quality of life in children and adolescents-revised version (KINDL, Ravens-Sierberer, & Bullinger, 1998) was also

used to assess children's perception of their quality of life. The KINDL is a 24-item generic instrument which yields six scales: (a) the Physical Well-being Scale, (b) the Emotional Well-being Scale, (c) the Self-esteem Scale, (d) the Family Scale, (e) the Friends Scale, and (f) the School Scale. Two different forms, developed for different age ranges (i.e., ages 8–11 and 12–16), were used. The KINDL has shown suitable internal consistency and construct validity against self-perceived health status in schoolchildren living in Catalonia (Rajmil et al., 2004b).

Pain

We asked the participating school children whether they had been experiencing pain in the preceding 3 months to the interview, and if they had, additionally they were asked for how long they had been experiencing that pain.

In this study, *chronic pain* was defined as pain lasting for at least 3 months (Elliott, Smith, Penny, Smith, & Chambers, 1999), that was experienced continuously or recurrently. A recurrent pain problem was one occurring once or twice at least each month (Mikkelsen, Salminen, & Kautiainen, 1997 for a similar procedure).

Medical History

Information regarding the child's use of health care was provided by the parents. More specifically, parents were asked whether their children had been hospitalized or received any surgical treatment during their life. If so, they were asked how many times, and the reason for their being in hospital or receiving surgical treatment. They were also asked how many times their child had visited a health care professional in the preceding year.

Parents were also requested to provide additional information regarding their children's current medical condition: that is, whether they had any illnesses at the time of interview. In order to gather this information, a list of illnesses was presented to them to choose from. Parents were asked to give a "Yes" or "No" response to each illness; if the appropriate illness was not on the list, parents were asked to report it. They were also asked whether their children had suffered from any acute and minor illness in the previous month to the assessment.

Functional Disability

The Functional Disability Inventory (FDI; Walker & Greene, 1991) was also used in this study. The FDI assesses 15 activities in a variety of contexts including school, home, recreation, and social interaction. The children are asked how much difficulty they had doing these activities because of their physical health, using a 5-point severity scale ranging from 0 (no trouble)

to 4 (impossible). The total score is obtained by summing the ratings. Thus, the greater the final score, the greater the level of functional disability is. The internal consistency of the scale is high. As to validity, the scale correlates with other measures of school-related disability, and somatic symptoms, for example, in clinical and healthy samples (Claar & Walker, 2006; Huguet, Miró, & Nieto, 2007; Walker & Greene, 1991).

Impact of the Children's Health Status on their Parents' Daily Routine

Parents were asked how much their child's health status had interfered with their own daily activities in the preceding month. An 11-point numerical scale was used, with the following anchors: 0 = It did not interfere at all; 10 = It interfered a lot.

Data Analysis Plan

To examine the factor structure of the self-administered version of the PedsQL a confirmatory factorial analysis (CFA) was performed using LISREL version 8.5; its factor structure had already been validated (Varni et al., 2001). Each item was assumed to load only on one factor such that items of the same subscale loaded on the same factor, the factors were allowed to correlate, and all residual correlations between items were zero. In the maximum likelihood approach to CFA, the χ^2 -test statistic was used to assess the goodness-of-fit of the model (Cole, 1987). However, because of the limitations associated with this statistical test as a result of the sample size effect (Marsh, Balla, & McDonald, 1988), several additional indices were also analyzed to better evaluate the goodness-of-fit of this model: namely, the Root Mean Squared Error of Approximation (RMSEA; Steiger, 1990), the Non-normed Fit Index, and the Comparative Fit Index (NNFI and CFI; Bentler & Chou, 1987). Since the model testing the factor solution recommended by Varni et al. (2001) was not supported by the data even after addressing some areas of misfit in the model, a new series of factor analyses were required. A cross-validation procedure was then performed. That is, the sample was randomly divided in two. Exploratory factor analysis (EFA) using a principal axis factoring procedure and oblimin rotation were performed on the first half to explore an alternative solution. The following aspects were considered in the building of a better solution: (a) the conceptual model and the original factors suggested by Varni et al. (2001); (b) the content of the items; and (c) the results provided by EFA. After that, CFA was applied on the second half of the sample to verify the EFA solution. To investigate the factor

structure of the interviewer-administered version of the PedsQL, a confirmatory approach was used.

For both versions of the PedsQL (i.e., self-administered and interviewer-administered versions) the internal consistency analysis for the total PedsQL score, and for each of the subscales, was completed with Cronbach's alpha. For both versions, support for the *construct validity* was also sought by examining whether there were substantial differences between groups whose quality of life was known to differ. We used the *t*-test for independent samples, and analysis of variance; the effect sizes were calculated to determine the magnitude of the differences on the quality of life between groups (healthy children vs. children with any diagnosed illness; healthy children vs. children who had suffered from any minor illness in the month previous to the assessment; children with no chronic pain vs. children with chronic pain). The *predictive validity* of both versions of the PedsQL was checked against functional disability and the impact of the children's health status on their parents' daily routines through correlations.

Finally, we examined the concordance between the self-administration procedure and the interviewer-administration procedure by looking at correlations, and the difference of means test. We also examined the effect of the child's age and gender on this concordance.

Results

Descriptive Characteristics of Participating Schoolchildren

Medical History

According to the information reported by participating parents, 15% of the children experienced a complicated birth, 11.7% were premature (i.e., less than 38 weeks of gestation), and 7.8% were overdue (i.e., more than 42 weeks of gestation). See Table I for additional related information.

Current General Health Status

According to the schoolchildren's reports, acute pain episodes were quite usual: 82.4% of the sample reported that they had experienced at least one episode of acute pain in the 3 months previous to the assessment, whereas 30.1% had suffered from chronic pain; these figures are very similar to those published in previous studies (Bloom, Dey, & Freeman, 2006; Perquin et al., 2000). Overall, participating schoolchildren reported a high level of quality of life (mean total KINDL score = 77.03, *SD* = 10.40), which is similar to the findings of several other previous studies (Rajmil et al., 2004b, Serra-Sutton et al., 2006). The positive

Table II. The Goodness-of-Fit Measures for Self-administered and Interview-administered Version Of The PedsQL

	Models	χ^2	<i>df</i>	RMSEA	NNFI	CFI
Self-administered version	Original 23-item version: four first-order factors load on two higher-order factors	868.30**	226	.078	.77	.79
	Removal item #5	810.84**	205	.080	.77	.80
	Removal item #6	730.09**	185	.080	.78	.81
	Removal item #23	559.34**	166	.071	.83	.85
	Removal item #22	474.77**	148	.069	.85	.87
	Item #8 related to emotional functioning	398.70**	148	.060	.87	.92
	Five first-order factors load on two higher-order factors (23-items)	681.72**	225	.066	.83	.85
Interviewer-administered version	Short 12-item version: four first-order factors load on two higher order factors	86.63*	50	.056	.92	.94
	Original 23-item version: Four first-order factors load on two higher-order factors	902.19**	226	.077	.72	.75
	Short 12-item version: Four first-order factors load on two higher order factors	113.43**	50	.050	.93	.95

* $p < .01$; ** $p < .001$.

self-perception of their health was also supported by reports from their parents. That is, the parents rated their child's quality of life very positively (mean = 8.44, $SD = 1.71$; 0–10 rating scale), and reported that the child's health status interfered little with their daily routine (mean = 0.69, $SD = 1.36$; 0–10 rating scale). The functional disability levels related to physical health reported by participating children were quite low (mean FDI score = 6.00, $SD = 7.20$), particularly if they are compared with the results from other studies with clinical samples (Eccleston, Crombez, Scotford, Clinch, & Connell, 2004; Kashikar-Zuck, Goldschneider, Powers, Vaught, & Hershey, 2001; Lynch, Kashikar-Zuck, Goldschneider, & Jones, 2006; Peterson & Palermo, 2004). See Table I for information provided by participating parents about children's current general health status.

Psychometric Properties of the PedsQL—Catalan Version

Feasibility

Self-administered Version

Missing values were examined to determine the feasibility of the self-administered version. When the PedsQL was self-administered, 0.24% of the items went unanswered. Floor effects were almost inexistent, and ceiling effects were highest for the Physical Health Summary and Social Functioning (Table V).

Interviewer-administered Version

When the PedsQL was interviewer-administered, all items had a response. The percentage of participants

scoring at the floor and ceiling of each PedsQL scales were similar between both modes of administration (see Table V).

Both versions took very little time to be answered (less than 5 min).

Confirmatory Factorial Analysis

Self-administered Version

A CFA was performed to examine the validity of the second-order PedsQL factorial structure suggested by Varni et al. (2001). Although five first-order factors emerged from the EFA conducted by Varni et al. (2001), the measure was modeled as a second-order structure whose first-order factors assessed four components instead of five (i.e., physical, emotional, social, and school functioning) as dictated by their theoretical model. The estimation of this model resulted in goodness-of-fit statistics that indicated that the model represents a poor fitting model to the data (Table II). In an attempt to find a good fitting model, items with primary factor loadings below 0.30 were removed from the model (i.e., items # 5, 6, 22, and 23²), and a large theoretical sense modification index suggested by LISREL was used (i.e., item # 8 was related to emotional functioning instead of physical functioning). Turning to the goodness-of-fit results, although improvement in overall fit was seen along the series of CFA, all parameter values still remained in an inappropriate range (Table II).

²The authors regret not being able to provide a complete list of items; the PedsQL is a copyrighted instrument.

Additionally, taking into account the internal structure with five first-order factors derived from EFA by Varni et al. (2001) as well as the relationship between item #22 and 23 which loaded poorly with their hypothesized primary factor in our data, a model of five first-order factors was also tested. The overall fit of the model, however, was not good (Table II).

At this point, the model was re-estimated within an exploratory, rather than a confirmatory mode. This exploratory approach was performed with a random first half of the sample who answered in full the self-administered version of the PedsQL ($N=231$). Consistently with results of the factor analysis reported in previous works (McCarthy et al., 2005; Reinfjell et al., 2006, Varni et al., 2001), a principal axis factor analysis yielded five eigenvalues larger than unity (Factor 1, eigenvalue 6.3, explaining 27.63% of variance; factor 2, eigenvalue 1.87, explaining 8.15% of variance; factor 3, eigenvalue 1.55, explaining 6.72% of variance, factor 4, eigenvalue 1.46, explaining 6.36% of variance; and factor 5, eigenvalue 1.41, explaining 6.15% of variance). The factors were rotated to oblique (oblimin) simple structures. Factors related to school functioning were loaded on two different factors as it is so reported in the original work by Varni and colleagues, and others (McCarthy et al., 2005; Reinfjell et al., 2006, Varni et al., 2001). After deleting two items related to school functioning which loaded on a same factor (i.e., item#22 and 23), we forced the number of factors to be four to be consistent with Varni's model (i.e., physical, emotional, social, and school functioning) and the items were rotated again. Then nine items were deleted from the exploratory derived scale because of the low-factor pattern coefficients (i.e., $<.40$) with their hypothesized primary factor loading or because of the high-factor pattern coefficients (i.e., $>.30$) with secondary factor loading. The factor loadings for the resultant short 12-item version is displayed in Table III. To examine the higher-order factor structure of the four subscales (i.e., physical, emotional, social, and school functioning), a principal axis factor analysis, specifying 2-factor solution, was performed in accordance with the Varni's model. The four subscales were calculated by averaging the items that loaded on each subscales. As it was expected, physical functioning subscale loaded on a higher-order factor labelled as physical health summary; and emotional, social and school functioning subscales loaded on another higher-order factor labelled as psychosocial health summary (Table IV). Physical Health Summary and Psychosocial Health Summary, which were

Table III. Exploratory Factor Analysis: Factors Loadings by Items of the Short 12-Item Version

Item	Factors			
	Health functioning	Emotional functioning	Social functioning	School functioning
Item #1	-0.202	-0.012	0.659	0.016
Item #2	0.142	0.057	0.836	-0.045
Item #3	0.249	-0.018	0.741	0.062
Item #10	-0.120	0.221	0.073	0.654
Item #11	-0.012	0.066	-0.027	0.830
Item #12	0.223	-0.144	0.021	0.659
Item #14	0.157	0.646	0.017	0.120
Item #15	-0.084	0.760	-0.003	0.090
Item #16	0.079	0.881	0.008	-0.105
Item #19	0.728	0.014	0.128	0.090
Item #20	0.732	0.006	-0.055	0.210
Item #21	0.828	0.126	0.007	-0.119

Extraction Method: Principal axis procedure. Rotation Method: Oblimin.

The solution converges in 11 iterations.

Sample size: $N=236$.

Bold indicates highest factor loading per item.

Table IV. Exploratory Factor Analysis: Higher-factor Loadings Amongst the Scales of the Short 12-item Version

Scales	Factors	
	Physical Health Summary	Psychosocial Health Summary
Health functioning	0.951	-0.008
Emotional functioning	0.123	0.753
Social functioning	-0.180	0.886
School functioning	0.363	0.551

Extraction Method: Principal axis procedure. Rotation Method: Oblimin.

The solution converges in 6 iterations.

Sample size: $N=231$.

Bold indicates highest factor loading per scale.

computed by averaging the items of the subscales that loaded on the two higher-order factors, were positively correlated ($r = .39$, $p < .001$).

The second half of the sample ($N=236$) was used to cross-validate the internal structure of the short 12-version derived from EFA. This model showed an acceptable fit to the data ($\chi^2_{(50)}=86.63$, $p < .01$; RMSEA = .056, NNFI = .92, and GFI = .94). Fig. 1 shows the relationships amongst the items and the factors in the model by the standardized factor loadings.

Interviewer-administered Version

As the transformations made to adapt the original self-administered version to be suitable for a new mode of administration (e.g., an interview) can fail to be effective, the factor structure of this new short 12-item version was evaluated through CFA. Both the original factor solution suggested by Varni et al. (2001) and the short 12-item

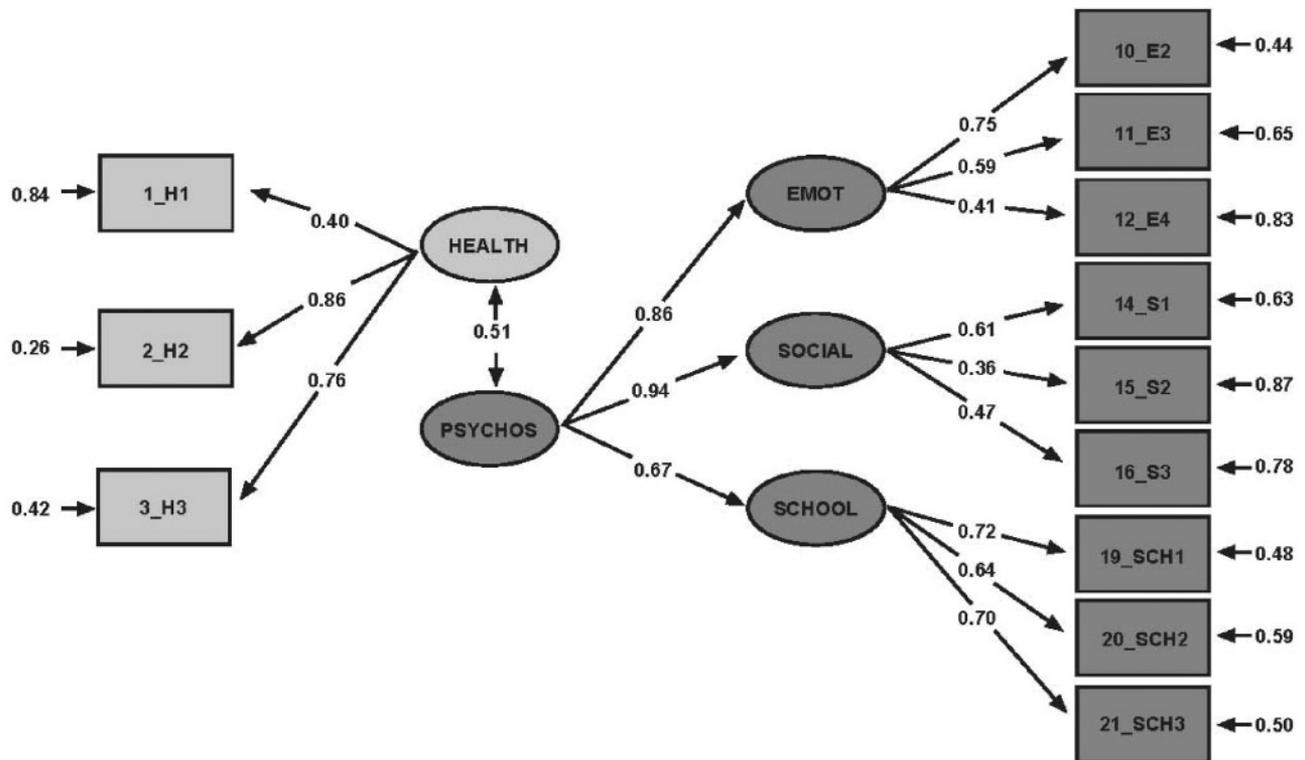


Figure 1. Second-order model of the self-administered short 12-item version of the PedsQL with standardized parameter estimates.

version resulting from our data were examined. As can be seen in Table II, the goodness-of-fit indices for our short 12-item version suggested a relatively good adjustment ($\chi^2_{(50)} = 113.43$, $p < .001$; RMSEA = .05; NNFI = .93; GFI = .95). Figure 2 shows the relationships amongst the items and the factors in the model by the standardized factor loadings.

Internal Consistency Reliability

Self-administered Version

Although the internal consistency reliability for the total scale score was found to be good ($\alpha = .76$) when the measure was self-administered, not all the PedsQL subscales reached the minimum Cronbach's standardized coefficient alpha recommended for comparing groups (i.e., $\alpha = .70$), these subscales were mostly the second-order scales (Table V).

Interviewer-administered Version

When the measure was self-administered, the coefficient alphas for each subscale were quite similar (Table V).

Since the psychosocial subscales were not reliable enough, their validity was not examined.

Validity

Self-administered Version

The *construct validity* of the self-administered version of the PedsQL was evaluated by the known-groups method.

The comparisons between mean group scores are shown in Table VI.

First, schoolchildren with a medical diagnosis (such as asthma, allergy, diabetes, cardiovascular disease, epilepsy, or migraine) were compared with healthy children. The hypothesis that healthy children, as a group, would score significantly higher on the PedsQL inventory was partially confirmed. In comparison with healthy children, although children with a medical diagnosis did not have lower total scores ($t = 1.69$, $p = .09$), they had lower physical functioning ($t = 2.11$, $p < .05$), and the effect size was small to medium. Their psychosocial functioning was not lower ($t = 1.16$, $p = .24$).

Second, the PedsQL scores from those schoolchildren who had had an acute or minor illness in the month previous to the interview (such as influenza, gastroenteritis, or cough) were compared with the scores from those children who reported not having suffered any illness. Children with a minor illness tended to have lower scores on physical functioning than those without (mean = 85.70 and 88.93, respectively), but contrary to our hypothesis, these differences did not achieve statistical significance ($t = 1.83$, $p = .06$).

Finally, we compared the scores of schoolchildren who reported chronic pain and those who did not and our hypothesis was confirmed. Namely, the mean total

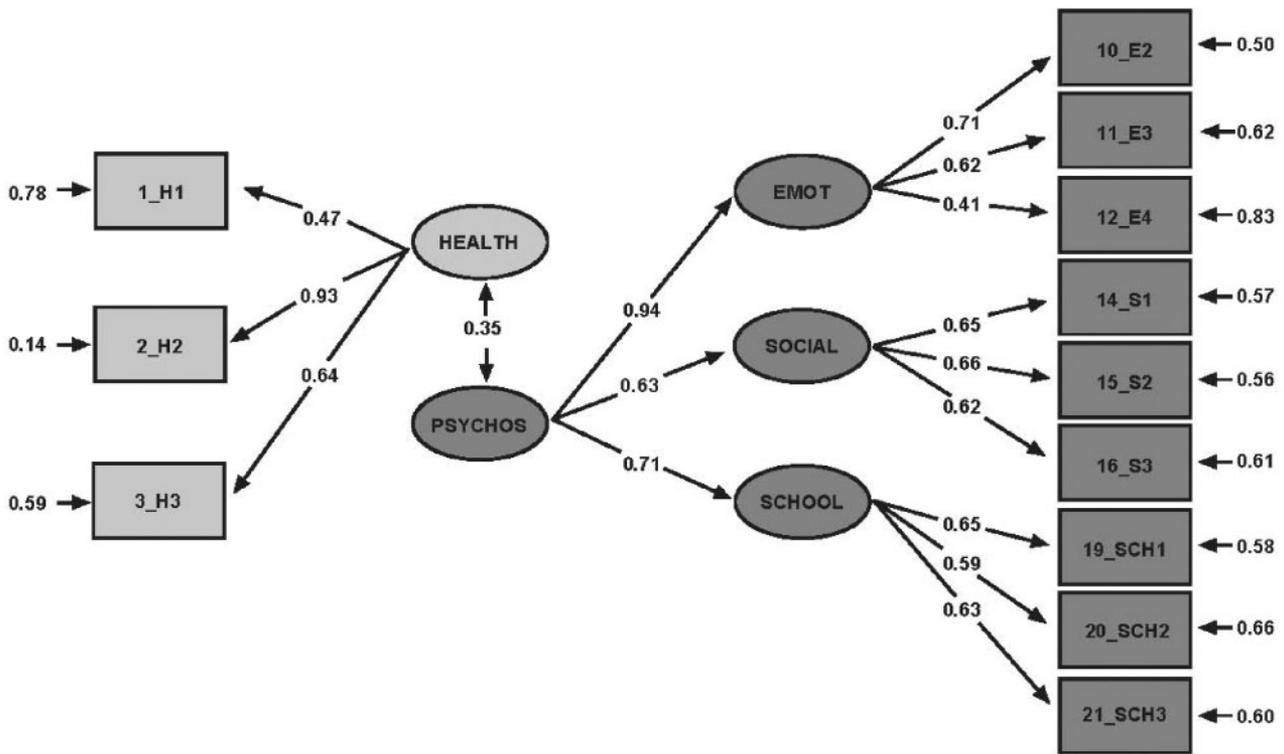


Figure 2. Second-order model of the interviewer-administered short 12-item version of the PedsQL with standardized parameter estimates.

Table V. Descriptive Scale and Internal Consistency Reliability Values

		N. of items	N	Mean (SD)	Min.	Max.	Ceiling effects N (%)	Floor effects N (%)	Cronbach's alphas		
									Total sample	Ages 9-12	Ages 13-18
Self-administered version	Total score	12	474	81.53 (11.57)	25	100	14 (3)	0	0.76	0.80	0.76
	Physical Health Summary	3	490	88.26 (14.15)	33.33	100	211 (43.1)	0	0.69	0.69	0.68
	Psychosocial Health Summary	9	475	79.33 (12.98)	19.44	100	17 (3.6)	0	0.75	0.77	0.78
	Emotional Functioning	3	489	72.36 (18.11)	0	100	44 (7.7)	1 (0.2)	0.60	0.57	0.57
	Social Functioning	3	483	88.66 (14.45)	16.67	100	209 (43.3)	0	0.68	0.63	0.72
	School Functioning	3	485	76.65 (17.67)	0	100	62 (12.8)	2 (0.4)	0.65	0.74	0.70
Interviewer-administered version	Total score	12	509	83.67 (11.10)	31.25	100	17 (3.3)	0	0.79	0.76	0.75
	Physical Health Summary	3	510	89.49 (14.37)	25	100	246 (48.2)	0	0.69	0.71	0.63
	Psychosocial Health Summary	9	510	81.70 (12.78)	16.67	100	24 (4.7)	0	0.77	0.74	0.75
	Emotional Functioning	3	511	76.78 (18.49)	8.33	100	87 (17)	0	0.60	0.60	0.63
	Social Functioning	3	511	89.38 (14.85)	8.33	100	251 (49.1)	0	0.64	0.66	0.75
	School Functioning	3	510	78.90 (17.15)	0	0	87 (17.1)	1 (0.2)	0.74	0.61	0.70

Floor effect: % of children and adolescents (for whom a score could be computed) who achieved the lowest possible score (i.e., 0); Ceiling effect: % of children and adolescents (for whom a score could be computed) who achieved the highest possible score (i.e., 100).

scores on PedsQL differed significantly such that children with chronic pain had a lower quality of life than children without ($t = 5.35, p < .001$), and both the physical and psychosocial dimension of the quality of life had a significantly lower score ($t = 3.63$ and $t = 4.85, p < .001$, respectively). Significant moderate effect sizes were found for all the domains examined.

Convergent validity, which supports the construct validity of the self-administered version of PedsQL, was assessed through correlations with the KINDL. The interrelationships among the scales of both quality of life measures are presented in Table VII. The PedsQL total score correlated with the KINDL total score ($r = .36, p < .001$), the Physical Health Summary was significantly

Table VI. Mean Scores and Standard Deviations for Each Group, Mean Difference Tests, and Effect Size for Differences In Means

Groups	Self-administered version						Interviewer-administered version					
	Total score		Physical Health Summary		Psychosocial Health Summary		Total score		Physical Health Summary		Psychosocial Health Summary	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Current medical diagnosis												
No diagnosis	312	82.28 (11.06)	325	89.00 (13.39)	313	80.11 (12.59)	341	84.71 (10.50)	341	90.71 (13.33)	342	82.67 (12.31)
Diagnosis	93	79.97 (13.20)	94	85.02 (16.78)	93	78.31 (14.42)	96	81.42 (12.28)	97	84.54 (17.22)	96	80.38 (13.91)
Mean diff. T-score		1.69		2.11*		1.16		2.60*		3.26**		1.57
Effect size		0.21		0.30		0.14		0.31		0.46		0.19
Minor disease in the last month												
No disease	267	82.01 (11.73)	277	88.93 (13.98)	268	79.80 (13.41)	288	84.24 (10.82)	289	89.91 (14.08)	289	82.31 (12.72)
Disease	85	81.30 (11.95)	88	85.70 (15.52)	85	79.77 (12.72)	90	82.52 (12.02)	90	85.65 (17.03)	90	81.48 (12.64)
Mean diff. T-score		0.48		1.83		0.02		1.28		2.15*		0.54
Effect size		0.06		0.23		0.00		0.16		0.30		0.06
Chronic pain												
No chronic pain	329	83.37 (10.73)	340	89.88 (13.25)	329	81.21 (12.03)	356	85.47 (10.14)	356	90.73 (13.82)	357	83.68 (11.57)
Chronic pain	145	77.37 (12.33)	150	84.61 (15.44)	146	75.09 (14.03)	153	79.48 (12.10)	154	86.63 (15.23)	153	77.08 (14.25)
Mean diff. T-score		5.35***		3.63***		4.85***		5.36***		2.97**		5.05***
Effect size		0.56		0.40		0.51		0.59		0.30		0.57

* $p < .05$; ** $p < .01$; *** $p < .001$.**Table VII.** Pearson Correlation Coefficients Between PedsQL Scales and KINDL Scales

		Total score	Physical Well-being Scale	Emotional Well-being Scale	Self-esteem Scale	Family Scale	Friends Scale	School Scale
Self-administered version	Total score	0.36***	0.29*	0.35*	-0.10	0.25**	0.36***	0.42***
	Physical Health Summary	0.26**	0.32***	0.17	-0.04	0.23**	0.30***	0.24**
	Psychosocial Health Summary	0.34***	0.26**	0.37***	-0.11	0.21*	0.33***	0.41***
Interviewer-administered version	Total score	0.48***	0.42***	0.50*	-0.06	0.34***	0.40***	0.43***
	Physical Health Summary	0.28***	0.34***	0.30***	-0.03	0.22**	0.21*	0.17*
	Psychosocial Health Summary	0.47***	0.38***	0.49***	-0.07	0.32***	0.40***	0.46***

* $p < .05$; ** $p < .01$; *** $p < .001$.

related to the Physical Well-being Scale of the KINDL ($r = .32$, $p < .001$), and the Psychosocial Health Summary was moderately related to the scales of the KINDL, which assess different psychosocial aspects of the quality of life, with the exception of two cases (Table VII). As far as the first exception is concerned, there was no relationship between scores on the Psychosocial Health Summary and scores on the Self-esteem Scale ($r = -.11$, $p = .21$), but self-esteem is a psychological component that is not assessed by the PedsQL. As far as the second exception is concerned, there was a small correlation between scores on the Psychosocial Health Summary and scores on the Family Scale ($r = .21$, $p < .05$), but family functioning is

not directly assessed by the PedsQL. Moreover, as could be expected, the correlations between the two quality of life measures tended to be higher on the subscales assessing similar domains (e.g., the Physical Well-being Scale of the KINDL with the Physical Health Summary of the PedsQL).

The *predictive validity* of the self-administered version of the PedsQL was supported by examining the association between quality of life (PedsQL) and the impact outcomes: interference with parents' daily routines due to the child's state of health and functional disability associated with physical status. As was expected, quality of life had a negative relationship with

the impact on parents' daily routines ($r = -.23$, $p < .001$). Those children whose parents reported higher levels of interference in their life due to their child's health status had significantly lower Physical and Psychosocial Health Summary scores ($r = -.14$, $p < .01$ and $r = -.22$, $p < .001$, respectively).

The functional disability outcome variable correlated significantly with both physical and psychosocial dimensions and, as was predicted, the strongest correlations were with physical functioning rather than with psychosocial functioning. Those children who reported higher levels of functional disability had lower physical functioning scores ($r = -.28$, $p < .001$), and lower psychosocial functioning scores ($r = -.21$, $p < .001$).

Interviewer-administered Version

Similar results for interviewer-administered version of the PedsQL were found. As far as construct validity data is concerned, there were significant differences between children with a medical diagnosis and healthy children as it was expected. That is to say, the ones with a medical diagnosis reported lower levels of quality of life ($t = 2.60$, $p < .05$) and lower levels of physical functioning ($t = 3.26$, $p < .01$). There were also significant differences in physical functioning between children who had had an acute or minor illness in the month previous to the interview and children who had not ($t = 2.15$, $p < .05$). And there were significant differences between children with chronic pain problems and children without chronic pain in all quality of life domains ($p < .01$) (Table VI).

As far as convergent data is concerned, although the correlations among the scales of interviewer-administered version of the PedsQL and the KINDL tended to be a bit higher than the correlations among the scales of the self-administered version of the PedsQL and the KINDL, data converged on a similar correlational pattern. The correlations are displayed in Table VII.

Finally, the results obtained from analyses conducted to examine the predictive validity of the interviewer-administered version also supported our hypotheses. Total, Physical Health Summary, and Psychosocial Summary scores were significantly related to both interference with parents' daily routines due to the child's state of health ($r = -.2$, $p < .001$ and $r = -.11$, $r = -.19$, $p < .05$; respectively) and functional disability associated with physical status ($r = -.36$, $r = -.34$ and $r = -.28$, $p < .001$; respectively).

Equivalence Between the Self-administered Version and the Interviewer-administered Version of the PedsQL

The total scores, as well as the Physical and Psychosocial Health Summary scores on the self-administered and the

interviewer-administered versions were highly correlated ($r_{\text{Total scores}} = .73$, $r_{\text{Physical Health Summary}} = .65$, and $r_{\text{Psychosocial Health Summary}} = .72$). However, there were significant differences in the PedsQL scores between the self-administration and the interviewer-administration of the inventory. Lower levels of quality of life were reported when participating schoolchildren completed the self-administered version of the PedsQL. Gender also affected the concordance between the self-administration and the interviewer-administration: agreement between both versions was greater in girls than in boys. The pattern of equivalence between the two versions was the following: boys and girls tended to report lower quality of life and lower psychosocial functioning when the PedsQL was self-administered, but not lower physical functioning. As far as the impact of the child's age is concerned, when children completed the interviewer-administered version, while the older group scored higher on total quality of life, physical and psychosocial functioning, the younger group scored higher on total quality of life and psychosocial functioning (Table VIII).

Discussion

A Catalan interviewer-administered version of the originally self-administered paper and pencil instrument was constructed after an accurate translation and cross-cultural adaptation. Both the self-administered and the new interviewer-administered versions of the PedsQL were tested with a large sample of Catalan-speaking schoolchildren aged between 9 and 17 years old. After collecting data, the factor structure of both versions was examined, the original 23-item version was rejected in both cases and a shorter 12-item version suggested instead. The results from factor analyses of the original 23 items in the current study resembled some findings related to problematic items of previously published works (McCarthy et al., 2005; Reinfjell et al., 2006; Varni et al., 2001), which is specially relevant considering the limited number of published works reporting the factor structure of the PedsQL (Bastiaansen, Koot, Bongers, Varni, & Verhulst, 2004; McCarthy et al., 2005; Reinfjell et al., 2005; Varni et al., 2001). Taken together, both self- and interviewer-administered short 12-item versions showed comparable reassuring statistical properties albeit with a few areas needing improvement.

The internal consistency indices for the three summary scales of both measures were satisfactory for group comparison, but sometimes insufficient for the second-order scales. This may be partly due to the small number of items in each of these scales. The construct

Table VIII. Comparison Between Scores on the Interviewer-administered Version and Scores on the Self-administered Version for the Total Sample, and According to the Child's Gender and Age Groups

	Total sample							
	Mean (SD)		$t_{(gl)}$	r				
	Interviewer-administered version	Self-administered version						
Total score	83.81 (11.03)	81.59 (11.56)	5.85**	0.73				
Physical Health Summary	89.48 (14.43)	88.32 (14.10)	2.15*	0.65				
Psychosocial Health Summary	81.94 (12.73)	79.34 (12.99)	5.92**	0.72				
	Boys				Girls			
Total score	84.54 (10.43)	81.68 (11.43)	5.16***	0.69	83.05 (11.59)	81.49 (11.72)	3.01**	0.77
Physical Health Summary	90.64 (13.79)	89.19 (13.44)	1.88	0.59	88.26 (15.01)	87.41 (14.74)	1.13	0.70
Psychosocial Health Summary	82.50 (12.25)	79.15 (12.98)	5.34***	0.70	81.36 (12.13)	79.54 (13.01)	2.97**	0.75
	Younger group (9-12 years old)				Older group (13-17 years old)			
Total score	84.51 (11.09)	82.52 (11.58)	4.64***	0.73	81.23 (10.48)	78.12 (10.86)	3.76***	0.70
Physical Health Summary	88.95 (15.15)	88.40 (14.08)	0.89	0.66	91.29 (11.48)	88.06 (14.24)	3.08**	0.65
Psychosocial Health Summary	83.01 (12.57)	80.55 (12.94)	5.01***	0.72	77.94 (12.62)	74.86 (12.20)	3.20***	0.70

* $p < .05$; ** $p < .01$; *** $p < .001$.

validity of both versions was supported by their ability to discriminate children with different health status; specifically, between healthy children and children with a medical illness, and between children with chronic pain problems and children with no chronic pain. These results echo those reported in previous studies (Connelly & Rappoff, 2006; Hunfeld et al., 2001, Ostkirchen et al., 2006, Palermo, 2001; Varni et al., 2003, 2006; Varni, Burwinkle, Rapoff, Kamps, & Olson, 2004). However, we found a lack of ability to distinguish between children who had had a minor illness in the month before the interview and children who had not in the self-report version of the PedsQL. This finding might be partially explained by the high ceiling effect on the higher-scoring children on physical scale, which restricts the ability to discriminate differences amongst higher-scoring children on this scale. In fact, skewed score distributions towards the end of the PedsQL scales have already been reported (Felder et al., 2004). The significant correlations between the PedsQL scales and most of the KINDL scales provided some additional evidence of the construct validity of both versions. The low correlations between the Self-esteem subscale and the Family subscale of the KINDL and the PedsQL scales can be attributed to the discrepancies between both quality of life measures. That is to say, although both PedsQL and KINDL assess quality of life, they address different domains (Rajmil et al., 2004a). Apart from that, the fact that the KINDL scales correlated more with the interviewer-administered PedsQL scales than with the self-administered PedsQL scales may be attributed to the mode of administration: the KINDL scales were

administered face-to-face. Some evidence of predictive validity of the self- and interviewer-administered versions was also provided by our data. Thus, the 12-item self-administered version performs as well as the original 23-item version in terms of construct, convergent, and predictive validity.

Further work on both 12-item versions of the PedsQL is necessary. First, the ceiling effects need to be reduced, possibly including items of greater difficulty. Second, the internal consistency for the second-order scales needs to be improved by developing new items with good psychometric properties. Third, additional studies need to be done to replicate these results, and to investigate the temporal reliability of both versions. Fourth, in order for these versions to be useful in clinical evaluations, studies with clinical samples also need to be conducted.

On the basis of our results, it is questionable whether the self-administration and the interviewer-administered short 12-item version of the PedsQL can really be considered comparable because lower levels of quality of life were reported in the self-administered version of the PedsQL. Therefore, clinicians and researchers within the context of pediatric health should be cautious about comparing quality of life information within-subjects and between-subjects using different forms of the questionnaire. If these results on the nonequivalence are confirmed in the future, additional studies should be conducted so as to determine which factors might be responsible for the discrepancies. Although mainly through adult studies, there are some reports which support the nonequivalence between different modes of administration of quality of life

measures (Beigner, Bobbit, Carter, & Gibson, 1981; Jörnagarden, Wettergen, von Essen, 2006; Lyons et al., 1999; Perkins, & Sanson-Fisher, 1998; Schunemann et al., 2003; Weinberger et al., 1994). At this point we can not conclude whether the discrepancy between responses obtained from both versions is due to the mode of administration, to the minor wording differences between both versions, or both of the above. At any event, our data are consistent with the data reported by previous studies showing a certain effect of the mode of administration in responses to health-related questions. These previous studies have suggested that response within an interview context shows a more social desirability bias than response collected from self-report measures. Thus, this issue could explain why interviewer-version of the PedsQL yielded a more positive quality of life from the participating children than the self-administered version did. This social desirability hypothesis has also been pointed out in studies focused on health-related behaviors such as drugs and alcohol consumption or sexual behavior (Aquilino & Losciuto, 1990). Moreover, our study showed that gender and age may also mediate these effects (see Jörnagarden et al., 2006 for similar results). Specifically, on one hand, since only female interviewers were involved, the answers from male children could have been more altered. Moreover, the tendency of boys to be more resistant than girls to verbally sharing information about their status of well-being, could also have had an effect. On the other hand, younger children might have been less affected by social desirability than older children when they rate their physical aspect of quality of life. In any case, future studies will have to focus on what can influence the results, and provide rationales so that clinicians and researchers can take informed decisions about how to best administer the PedsQL in each case.

Appendix

Appendix 1. Pediatric Quality of Life Inventory Generic Core Scales publications classified according to their use

1. Publications studying the psychometric properties of PedsQL™

Pediatric Quality of Life Inventory Generic Core Scales

General population

Clinical population

Upton et al., 2005; Varni et al., 2007b, 2007c, 2006a; 2003a, 2001.

Uzark et al., 2003; Varni et al., 2007b, 2007c, 2006b, 2004b, 2003, 2002a, 2002b, 2002c, 2001; Varni & Burwinkle, 2006; Goldstein et al., 2006; Connelly and Rapoff, 2006; McCarthy et al., 2005; Bastiaansen et al., 2004a.

2. Publications studying the psychometric properties of PedsQL™

PedsQL Modules

Chan, Chow, & Lo, 2005; Palmer et al., in press; Uzark et al., 2003;

Varni et al., 2007a, 2006b; Varni et al., 2004a, 2004b, 2003, 2002a; 2002b; Upton et al., 2005.

There are some limitations within this study. First, the medical information reported here was based exclusively on parental reports, and sometimes participating parents did not provide the requested information. Second, the children answered both self- and interviewer-administered versions with a short interval between administration, consequently children's responses from the second administration may have been biased by a potential learning effect.

In conclusion, the results of the present study suggest that both the self- and interviewer-administered short 12-item versions of the PedsQL are reliable and valid but they are not equivalent. Although the child's participation rate was not as high as other studies report due to time consumption, the large sample size, the randomized study design, and the consistencies between our findings with those from previous published works, provide some guarantee that our results may be fairly generalizable to the population of Catalan-schoolchildren aged between 9 and 17 years.

Acknowledgments

The authors wish to thank Dr Varni for his assistance with the back-translation procedure.

Preparation of this article was supported by a grant from the Departament d'Universitats, Recerca i Societat de la Informació de la Generalitat de Catalunya and the Fons Social Europeu awarded to Anna Huguet, and by grants SEJ2006-15247/PSIC and SEJ2006-1430/PSIC from the *Ministerio de Educación y Ciencia* awarded to Jordi Miró.

Conflict of interest: None declared.

Received January 24, 2007; revisions received April 13, 2007; accepted April 19, 2007

Appendix 1. Continued

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3. Publications studying the psychometric properties of different forms of the PedsQL™. Pediatric Quality of Life Inventory Generic Core Scales
- Chan et al., 2005; Sherman et al., 2006; Varni et al., 1999.
4. Publications developing different cultural or language versions of PedsQL™ Pediatric Quality of Life Inventory Generic Core Scales
- Chan et al., 2005; Felder-Puig et al., 2004; Reinfjell et al., 2006; Upton et al., 2005.
5. Publications attempting to describe quality of life
- General population
- Clinical population
- Mansour et al., 2003.
- Alpert et al., 2005; Bhat et al., 2005; Biard et al., 2005; Bucuvalas et al., 2003; Bastiaansen et al., 2004a; Crabtree et al., 2004; Curran et al., 2003; Curran et al., 2004; De Clercq et al., 2004; Eiser et al., 2005a, 2005b; Favreau et al., 2006; Felder-Puig, 2006; Friefeld et al., 2004; Goyal et al., 2006; Ismail et al., 2006; Johnson et al., 2006; Lau et al., 2006; Laffel et al., 2003; Lindman et al., 2005; McCarthy et al., 2006; Mckenna et al., 2006; Meeske et al., 2004; Moorthy et al., 2005; Parekh et al., 2006; Pinhas-Hamiel et al., 2006; Powers et al., 2003; Pongwilairat et al., 2005; Powers et al., 2003; Sheppard et al., 2005; Schwimmer et al., 2003; Sawyer et al., 2005; Talarska, 2005; Thomas et al., 2006; Youssef et al., 2006; Youssef et al., 2005; Zeller et al., 2006; Zeller & Modi, 2006;
6. Publications using the inventory to assess the effectiveness of a treatment
- Alpert et al., 2005; Chase et al., 2005; Eiser et al., 2006; Hays et al., 2006; Hicks, von Baeyer, Spafford, van Korlaar, & Goodenough, 2006; Mangione-Smith et al., 2005; Packman et al., 2004, 2005; Poretti et al., 2004; Hinds et al., 2005; Powell et al., 2005; Razzouk et al., 2004; Razzouk et al., 2006; Riddle et al., 2006; Rudolf et al., 2006; Rose et al., 2005; Schwimmer et al., 2005; Seid et al., 2006; Soo et al., 2005; Sallee et al., 2004; Valenzuela et al., 2006; Wigal et al., 2005; Youssef et al., 2004.
7. Publications using the inventory to examine the relationship between variables
- PedsQL™.4.0 as a predictor
- PedsQL™.4.0 as an outcome measure
- Seid et al., 2004, 2005.
- Bastiaansen et al., 2005a, 2005b; Berrin et al., 2006; Brunner et al., 2004, 2005, 2006; Bucuvalas et al., 2003; Burdette et al., 2003; Chan et al., 2005; Casey et al., 2005; Curran et al., 2004; Friefeld et al., 2004; Grilli et al., 2006; Hassan et al., 2006; Laffel et al., 2003; Mah et al., 2006; Mansour et al., 2003; Meeske et al., 2006; Moorthy et al., 2005; Oddson et al., 2006; Pirpiris et al., 2006; Slomine et al., 2006; Sawyer et al., 2005; Sawyer et al., 2004; The Pediatric Obesity Prevention Study, 2006; Thomas et al., 2006; Ungar et al., 2006; Valenzuela et al., 2006; Williams et al., 2005; Windle et al., 2004; Zeller & Modi, 2006;
8. Publications using the inventory for other purposes
- Creameens et al., 2006; Wysocki and The Diabetes Research in Children Network Study Group (2006); Kolotkin et al., 2006; Seid et al., 2004; Seid & Varni, 2005; Eiser et al., 2003 (125). Varni et al., 2005; Young et al., 2005;
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