

The Psychometric Properties of the New Turkish Generic Health-Related Quality of Life Questionnaire for Children (Kid-KINDL)

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Abstract

Objective: There are few health-related quality of life (HRQOL) instruments available that have been validated for use with Turkish children. The Kid-KINDL is a generic measure of children's (8-12 years) HRQOL, which contains 24 categorical items that assess 6 dimensions (physical well-being, emotional well-being, self-esteem, family, friends, and school). The Kid-KINDL is available in many languages. Following an elaborate translation procedure and cognitive focus group interviews, the Kid-KINDL was adopted into Turkish. This paper describes the psychometric properties of the new Turkish Kid-KINDL.

Methods: In total, 1918 children aged 8-12 years at a school in Manisa completed the Kid-KINDL. A confirmatory approach was used for validity and reliability analysis. Using the Multi-trait/Multi-item analysis program (MAP) item-internal consistency and item-discriminant validity were calculated to confirm the instrument's structure. Likert scaling assumptions were tested and confirmatory factor analysis (CFA) was applied as well. After modification of 2 unsatisfactory items the Kid-KINDL was administered to a different group of 84 randomly selected children and the analyses were repeated.

Results: Cronbach's alpha was 0.35-0.78 before and 0.54-0.78 after the scales was modified. MAP-scaling success was 60%-100% before and 90%-100% after the modification. CFA confirmed the Kid-KINDL structure for the original version (RMSEA = 0.077) was less than the modified version (RMSEA = 0.059), although for the latter the sample was rather small. Floor effects were negligible, and ceiling effects reached 19%.

Conclusion: The results indicate that the Turkish Kid-KINDL was a reliable and factorially valid assessment of the children's HRQOL. The modifications made to the 2 unsatisfactory items increased the psychometric quality of the scale.

Key Words: Health Related Quality of Life, Children, Validation, Turkey

INTRODUCTION

In general, quality is a degree of well-being. Quality of life is a more general concept that includes personal well-being, beyond personal health status. While Mendola and Pelligrini (1979) defined quality of life as, "an individual's achievement of a satisfactory social situation within the limits of perceived physical capacity" (Bowling A. 1993), WHO has defined quality of life as, "an individuals' perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns". Quality of life can be simply

framed as personal response to disturbances that have physical, emotional, and social effects in certain life conditions. Therefore, evaluation of quality of life is more extensive and comprehensive than evaluation of health status (Bowling A., 1993; Orley and Kuyken, 1993; The WHOQOL Group, 1996).

Health-related quality of life (HRQOL) is explained as the subjective perception of a patient's health status, and subjective perceptions are directly related to an individual's psychosocial status. In recent years, the HRQOL approach has been used extensively in adult and child liaison psychiatry as an approach for investigating the psychosocial outcomes of physical health problems.

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The role and meaning of HRQOL evaluations, as a variable outcome, have been increasingly investigated in clinical and health economy studies in recent years (Ravens-Sieberer et al., 2006). Nowadays, doctor-centered traditional and objective clinical assessment criteria are not sufficient for the evaluation of medical arguments, additionally, subjective perception of a patient's health status should also be taken into consideration. Among 3 types of health outcomes (clinical, financial, and patient-centered outcomes) of the medical arguments based on observation and routine medical services, it is suggested that one should evaluate the outcomes of patient-centered HRQOL that reflects perceived health status (Guyatt et al., 1997; Kozinetz et al., 1999; Varni et al., 1999; Seid et al., 2000; Bullinger et al., 2002). Globally, there are a number of available generic health-related quality of life instruments developed for children and adolescents. These are the Child Health and Illness Profile [CHIP] (Starfield et al., 1993), Child Health Questionnaire [CHQ] (Aitken et al., 2002), Child Health-Related Quality of Life Questionnaire [CQOL] (Graham et al., 1973), Exeter Health Related Quality of Life Questionnaire [EHRQL] (Eiser, 2000), Pediatric Quality of Life Inventory [PEDIQL] (Varni et al., 2003), Health Utilities Index [HUI2 and HUI3] (Feeny et al., 1996), Warwick Child Health and Morbidity Profile [WCHMP] (Spencer and Coe, 1996), and the generic children's health-related quality of life questionnaire [KINDL] (Ravens-Sieberer and Bullinger, 1998). The KINDL questionnaire is used in order to explore which of the life dimensions are most affected because of an illness or its treatment in children who have chronic symptoms [ventilator-dependent children (Noyes, 2007), children with diabetes (Gundlach et al., 2006; de Wit et al., 2007), and children with developmental disorders (Furusho et al., 2006)]. The KINDL questionnaire has been translated into many languages in recent years (Serra-Sutton et al., 2006; Wee et al., 2007).

There are very few validated HRQOL instruments available for Turkish children (Ozdogan et al., 2001; Yüksel et al., 2004; Memik NÇ et al., 2007). This highlights the growing need for validated and reliable HRQOL instruments for Turkish children. The generic KINDL, which is the subject of this study, will be one of the first instruments that will be used to assess the success of the medical interventions on children in Turkish pediatric clinical settings.

The KINDL is a self-report questionnaire, which is available for 3 different age groups: the Kiddy-KINDL for children 4-7 year olds (administered by an interview-

er), the Kid-KINDL for children 8-12 year olds, and the Kiddo-KINDL for adolescents 13-16 year olds. Additionally, there are 2 parent forms for indirectly evaluating the quality of life of young children (4-7 years), and older children and adolescents (8-16 years) (Bullinger, 1994; Ravens-Sieberer and Bullinger, 1998).

The present study aimed to adapt Kid-KINDL as an HRQOL instrument for use with Turkish children by studying its validity, reliability, and practicability.

METHOD

The present study was a methodological validity-reliability analysis.

Sample

In this study, data obtained from 2 consecutive groups was used. The larger group (BG, n =1918) was a sample from a cross-sectional study conducted in central Manisa, Turkey with school children aged 8-12 years. Following the selection of 2232 children using stratified and cluster sampling methods, 1918 children were included in the study; a participation rate of 85.9%. Mean age of the participants was 10.4 ± 1.1 years, 54% were male, and 46% were female. Approximately 18% of the children reported any kind of disturbance during answering the questionnaire.

The analysis of data obtained from BG showed that 2 items on the questionnaire were problematic. The new questionnaire that was formed by modifying these 2 items, in terms of Turkish expression, was administered to a smaller second group (SG, n = 84), which was randomly chosen. Mean age of SG was 10.4 ± 1.0 years, 50.0% were male, and 50.0% were female. In SG 19% of the children reported any kind of a disturbance. Herein we present the results separately for the 2 groups.

Data Collection Instruments

KINDL (Kinder Lebensqualitätsfragebogen: Children's Quality of Life Questionnaire) is a generic HRQOL instrument specifically developed for children and adolescents. KINDL was first created in German and then translated into 14 other languages (www.kindl.org 2006). Age-specific versions of KINDL take into consideration variations observed in children's quality of life over the course of development. The Kid-KINDL for children and the Kiddo-KINDL for adolescents consist of 24 categorical items (5-point Likert-type scale) and 6 dimensions. The 6 dimensions assess physical well-being, emotional well-being, self-esteem, family, friends, and

Table I. Descriptive statistics, correlation coefficients corrected for overlap, and internal consistency of Kid-KINDL and its sub-dimensions.

	Dimensions	Mean	Standard deviation	Floor (%)	Ceiling (%)	Internal Consistency (α)	Total Health Quality *
Big Group (BG) Data Set (n = 1918)	Physical well-being	15.02	3.25	0.2	10.8	0.56	0.37
	Emotional well-being	15.12	3.20	0.8	9.2	0.53	0.46
	Self-esteem	13.26	3.89	1.6	8.6	0.61	0.33
	Family	16.29	3.19	0.5	18.9	0.56	0.51
	Friends	15.67	3.09	0.1	12.6	0.35	0.44
	School	15.61	3.41	0.6	16.2	0.58	0.40
	Total HQ	90.97	12.50	0.0	0.3	0.78	---
Small Group (SG) Data Set (corrected version) (n = 84)	Physical well-being	14.73	3.42	1.2	6.0	0.69	
	Emotional well-being	14.56	3.32	1.2	2.4	0.60	
	Self-esteem	12.69	3.40	1.2	1.2	0.57	
	Family	16.15	3.03	0.0	14.3	0.62	
	Friends	15.93	2.98	0.0	11.9	0.57	
	School	15.27	3.07	2.4	1.2	0.54	
Total HQ	89.32	11.60	0.0	0.0	0.78		

*Correlation coefficients corrected for overlap. All correlations are significant below $P < 0.001$.

school (school or kindergarten). Each dimension consists of 4 items. Subscale scores are calculated independently and then a total HRQOL score is obtained by adding the 6 subscale scores. As opposed to the other versions, only a total score is calculated for Kiddy-KINDL (4-7 years), which consists of 12 questions. KINDL may be used for the assessment of healthy children and children with a chronic disease, both in clinical and non-clinical settings. Kid-KINDL items are answered on a 5-point Likert-type scale, ranging from 1 (never) to 5 (always). Some items (1, 2, 3, 6, 7, 8, 15, 16, 20, and 24. items) with a negative orientation needed to be reverse coded, depending on the statement. For each dimension, the subscale scores are transformed to 0-100 scoring scale. A high score is an indication of good HRQOL. Previous studies showed that KINDL is a valid and reliable instrument for measuring HRQOL. In the first validity study of KINDL, the Cronbach's alpha score for the en-

tire instrument was 0.95 and the KINDL gave sufficient correlation coefficients (>0.70) with other instruments measuring similar concepts. The test-retest correlation coefficient of the KINDL was 0.80 (Ravens-Sieberer and Bullinger, 1998). In another study the intra-class correlation coefficient for test-retest reliability was between 0.71 and 0.85 (Ravens-Sieberer, 2002).

In the present study, an additional questionnaire that collects socio-demographic characteristics in children was also administered. Permission to perform this study were granted by İl Milli Eğitim Müdürlüğü (The Department of National Education, Manisa Branch) and by school administrators. Data from BG was collected in April 2004, and data from SG was collected in September 2004.

Procedure

Internationally approved methods were followed

Table II. Success summary of the item-discriminant validity results (%).

Dimensions	-2	-1	1	2	1 + 2	
BG Data Set (n = 1918)	Physical well-being	5.0	0.0	25.0	70.0	95.0
	Emotional well-being	15.0	0.0	20.0	65.0	85.0
	Self-esteem	0.0	0.0	0.0	100.0	100.0
	Family	0.0	0.0	10.0	90.0	100.0
	Friends	25.0	15.0	20.0	40.0	60.0
	School	15.0	5.0	5.0	75.0	80.0
	Total HQ	10.0	3.3	13.3	73.3	86.7
SG Data Set (n = 84)	Physical well-being	0.0	5.0	25.0	70.0	95.0
	Emotional well-being	0.0	10.0	40.0	50.0	90.0
	Self-esteem	0.0	0.0	45.0	55.0	100.0
	Family	0.0	5.0	40.0	55.0	95.0
	Friends	0.0	10.0	60.0	30.0	90.0
	School	0.0	0.0	50.0	50.0	100.0
	Total HQ	0.0	5.0	43.3	51.7	95.0

2: Item has significant and high correlation with its dimension.
 1: Item has high correlation with its dimension.
 -2: Item has significant and low correlation with its dimension.
 -1: Item has low correlation with its dimension.

during the KINDL adaptation process (Guillemin et al., 1993; Ware et al., 1995; Landgraf et al., 1998; Raat et al., 2002). Adaptation to Turkish consisted of the following steps: 1. Two advanced translations from English to Turkish, independent of each other; 2. Combining of the 2 advanced translations by a doctor with an advanced level of English and the formation of a single instrument based on consensus; 3. Back translation of the combined advanced translation to the original language, German, by a bilingual translator (native speaking level of Turkish and German); 4. Comparison of the back translated instrument to the original instrument by the creators of the original instrument, and discussion of the necessary arrangements by the creators and the Turkish study group; 5. Cognitive-conceptual interrogation of the consensus-based Turkish version (agreed upon by the creators and the Turkish researchers) with 10 selected school-aged children, evaluation of suggestions regarding the items in these sessions, making necessary language-based changes to the Turkish version, and forming the

KINDL Turkish pilot versions; 6. Administration of the instrument to 1918 children aged 8-12 years old (BG); 7. Analysis of the data obtained from BG; 8. Modifying the Turkish version of two problematic items (K504 and K604) with the help of the pediatricians, educationalists, and children's suggestions; 9. Administration of the new instrument to a group of randomly selected 8-12-year-old school children (SG, n = 84), and analysis of the new items; 10. Final reliability and validity analysis.

Confirmatory approach was adopted for the analysis of both the reliability and validity data. Reliability analysis was conducted using MAP (Multi-trait/Multi-item analysis program) (Ware et al., 1997). Validity analysis was conducted using SPSS v.11.0 and LISREL v.8.54 (SSII 2003) was used for confirmatory factor analysis.

During the assessment of internal consistency of the dimensions of the KINDL Cronbach's alpha, mean, standard deviation, and floor and ceiling effects were calculated. Additionally, during the reliability analysis,

Table III. Confirmatory factor analysis* results.

Dimensions	BG (n = 1918)		SG (n = 84)	
	RMSEA [§]	CFI [#]	RMSEA [§]	CFI [#]
Physical well-being	0.071	0.98	0.103	0.97
Emotional well-being	0.018	0.99	0.000	1.00
Self-esteem	< 0.001	> 0.99	0.174	0.79
Family	0.158	0.87	0.000	1.00
Friends	0.071	0.94	0.118	0.92
School	< 0.001	> 0.99	0.000	1.00
Total HQ	0.077	0.88	0.059	0.80

*LISREL version 8.54 was used.

[§]Root mean square error of approximation (RMSEA).

[#]Comparative fit index (CFI).

Pearson's correlation coefficients, corrected for overlap, of total dimension scores was analyzed.

During the validity analysis, the independent group t-test was conducted to determine the validity of the instrument in previously known groups. In other words, the instrument's discriminant validity was tested using the mean difference between subgroups (male vs. female; low income vs high income etc.), and was presented by the "effect size" (ES) statistics (Cohen, 1988). Confirmatory factor analysis was used to determine the instrument's construct validity, and the comparative fit index (CFI) with the root mean square error of approximation (RMSEA) parameters were evaluated. It was assumed that as CFI approached 1.0 the goodness of fit to the hypothetical dimension structure would improve. As another criterion that tests the goodness of fit to the proposed model, the RMSEA value was accepted to be less than the critical value of 0.08.

RESULTS

The adaptation of Kid-KINDL to Turkish was performed in two stages. The first stage was the pilot version preparation stage and the second stage was the analysis of the pilot data. The first stage included the 5 steps described in the procedure section. A cognitive interrogation was conducted independently with 10 children, which led to minor modification of four items on the

Turkish pilot version of Kid-KINDL. During the second stage two items in the friends and family dimensions were rewritten, the entire instrument was re-administered to the children, and data obtained with the pilot version were analyzed. These changes were also approved by the author that created the original instrument.

The overall response quality of Kid-KINDL was good. Systematic refusal was not displayed for any items. The rate of unanswered items for the specific questions was between 0.4% (item 17) and 2.0% (item 3). In other words, the questions arranged as positive and negative were answered in a consistent manner. The frequency analysis used for the Kid-KINDL questions showed that there was a floor effect of < 2.5% for each dimension in BG and SG. The ceiling effect was acceptably low for all the dimensions, except family and friends. On the other hand, a decreasing ceiling effect was observed, especially on the school dimension of the corrected version (SG).

The confirmatory test showed that the alpha coefficient for the internal consistency was > 0.75 for the entire instrument. The alpha coefficient for the subscales was fairly well developed (> 0.50), specifically for the friend dimension (SG data). The corrected coefficient value obtained according to the overlap of the total quality of life with each dimension varied between 0.33 and 0.51 (P < 0.001) (Table I).

Table II presents item-discriminant validity results

Table IV. The discriminant characteristic of Kid-KINDL total health quality and its sub-dimension scores, according to the socio-demographic characteristics of the study group [effect size^a values of independent t-test results (BG)].

Variables [categories]	Physical well-being	Emotional well-being	Self-esteem	Family	Friends	School	Total Health Quality
Gender* [female [§] < male]	0.19 [†]	0.13 [†]	ad	ad	ad	0.09 [†]	ad
Health status (self-report) [ill < healthy]	0.56 [†]	0.32 [†]	ad	0.23 [†]	0.27 [†]	0.18 [†]	0.43 [†]
Family income (perceived) [low < average or high]	0.56 [†]	0.45 [†]	0.21 [†]	0.42 [†]	0.40 [†]	0.21 [†]	0.60 [†]
Family's social class [low < high]	0.64 [†]	0.56 [†]	0.42 [†]	0.45 [†]	0.19 [†]	0.26 [†]	0.71 [†]
Mother's education [uneducated < educated]	0.54 [†]	0.44 [†]	0.42 [†]	0.31 [†]	0.37 [†]	0.34 [†]	0.21 [†]
Child's work outside of school [working < not working]	0.53 [†]	0.38 [†]	ad	0.16 [†]	0.58 [†]	0.23 [†]	0.24 [†]
Average school average [low < high]	0.69 [†]	0.50 [†]	0.50 [†]	0.39 [†]	0.42 [†]	0.42 [†]	0.43 [†]

^aEffect Size "d" = [(mean 1 - mean 2)/common standard deviation].

Effect Size evaluation scale: 0.20 = small; 0.50 = medium; 0.80 = large (Cohen, 1988).

[§] "<" and ">" show bigness/smallness relationship of scale scores in the sub-groups.

[†]P < 0.05; [‡]P < 0.001; ^{ad}not significant; *in school dimension female's score > male's score.

of each dimension for both study groups (BG and SG). Rates > 95% for all the dimensions (shows high correlation with their dimensions) were very good indicators discriminant validity. The discriminant validity results following modification of 2 items (item 20 and item 24) in friends and family dimensions were consecutively 60%, 90%, 80%, and 100%.

Confirmatory factor analysis for testing the validity of the instrument was administered to data obtained from both BG and SG, and the results were found to be quite congruent. For BG, the HRQOL value was < 0.08 for the total instrument and in all the dimensions, except the family dimension. The HRQOL value for the total quality of life structural model was 0.077 in BG and 0.059 in SG (Table III). The construct validity CFA results for the total quality of life model in SG is separately presented in Figure I.

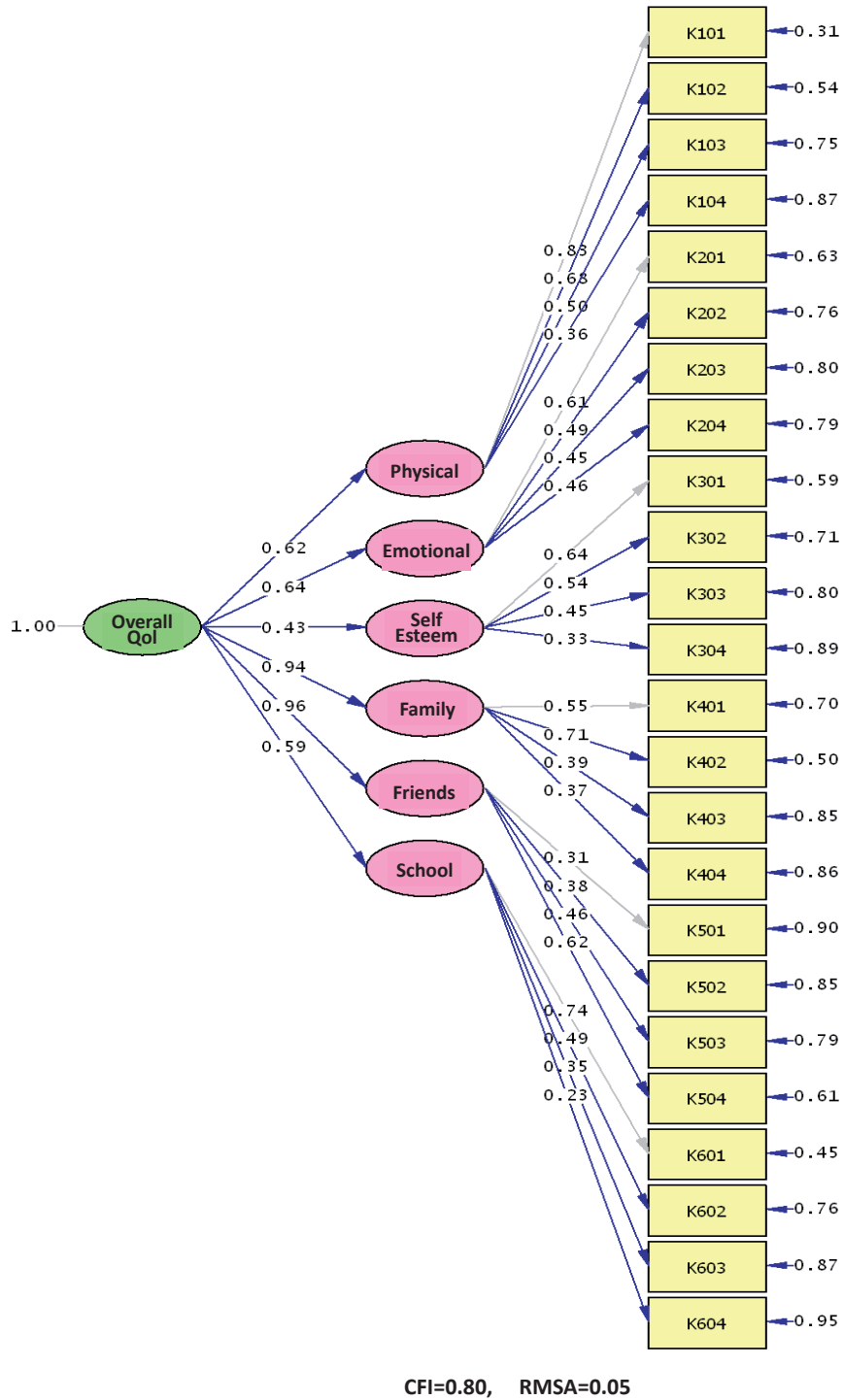
The final analysis was conducted between pre-defined subgroups according to demographic and socioeconomic levels in order to test the discriminative characteristics of Kid-KINDL, and the results are presented in Table IV. The total questionnaire score and scores on all

the dimensions significantly discriminated gender and socioeconomic groups. Being a male, perceiving his/her health status as good, having a high family income and coming from an upper level social class, having a more educated mother, not working before or after school, and having a high level of school performance significantly indicated a high level quality of life in total and in all the dimensions compared to the other conditions. The greatest Effect Size was shown to be between the social class and family income items, and the total quality of life. Moreover, when 3 dimensions were taken into consideration (physical well-being, emotional well-being, and self-esteem), in addition to social class and average school performance created the greatest Effect Size.

Discussion

The internal consistency of Kid-KINDL was generally in the acceptable range for group-level comparisons (Nunnally and Bernstein, 1994). Although the ceiling effect was significantly high, especially for the family and friends dimensions, the floor effect was low for all the dimensions. In Asian studies the ceiling effect for Kid-KINDL and Kiddo-KINDL was high. Specifically,

FIGURE 1. Confirmatory Factor Analysis (SG).



the family and friends dimensions demonstrated a significantly high ceiling effect in the validity studies of the Asian versions of KINDL validity (Wee et al., 2005;

Wee et al., 2007). A significantly high ceiling effect was also observed in a study by Warschburger (2003), who analyzed the psychometric properties of another instru-

ment titled Child Health Questionnaire that measures HRQOL in children, and in a study by Raat (2005) similarly for the family dimension (Warschburger et al. 2003; Raat et al., 2005). The increase in the Cronbach's alpha score and the decrease in the ceiling effect observed in the SG data set might have been due to the difference in the sample size. CFA results showed that Kid-KINDL displayed good validity values in terms of CFI and RMSEA, except for the family dimension. Similarly, incongruence in some of the dimensions was observed in other studies as well. For instance, the results of factor analysis conducted for the Norwegian version of KINDL showed that the school dimension was grouped under 2 different constructs, and the items belonging to the emotional well-being and friends dimensions were combined under 1 dimension (Sølvi Helseth, 2005). In a Kid-KINDL study conducted in Singapore, 8 factors appeared in the explanatory factor analysis, as opposed to the original version, and similar shifts were observed (Wee et al., 2007).

All the dimensions of the Turkish Kid-KINDL perfectly discriminated inter-group differences. Gender differences in the dimension scores were in favor of males, which is consistent with the results of previous studies (Fernandez-Lopez et al., 2004; Rajmil et al., 2004). This advantageous condition of males was also demonstrated in adult HRQOL studies (Klassen et al., 2004; Bisegger et al., 2005). The gender difference observed in the present study might be an indicator of the difference and/or inequality of beginning to school age because of both biological conditions and environmental effects.

Despite the high ceiling effect in the family dimension, the ability to distinguish differences in demographic and socioeconomic characteristics was adequate.

The expected discriminant characteristic of the physical well-being dimension in HRQOL instruments is that

it can determine differences between physical deficiencies in individuals. The present study determined that the Turkish Kid-KINDL showed this characteristic in the physical well-being dimension. Moreover, one of the most important results of the present study is that the Turkish Kid-KINDL dimension scores were very sensitive to the variables of social class and family income (as seen in Effect Size values). Sharp socioeconomic class differences were reported for different HRQOL levels in various adult studies and child studies (Macintyre et al., 2003; Mansour et al., 2003; Spurrier et al., 2003; Drukker et al., 2005).

Moreover, it was observed that the frequently used dimensions of HRQOL instruments (physical well-being, emotional well-being, and self-esteem) are greatly influenced by the average school performance variable, in addition to the social class variable, which might be related to the fact that school performance is associated with economic variables that are important components of quality of life.

KINDL is an instrument that has a similar number of items and dimensions as Kiddo-KINDL (for 13-16-year-olds). Determination of the validity and reliability of the Turkish Kiddo-KINDL is planned as a separate future study because of the differences in questionnaire structure and the possible confounding effect of the different age groups.

CONCLUSION

The Turkish version of Kid-KINDL is an appropriate HRQOL instrument that can be used for school health studies among school-aged children, and it can also be administered as a generic instrument to evaluate HRQOL together with illness-specific questionnaires in clinical studies.

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