

# Validity and reliability of a quality-of-life assessment instrument in children aged between 6 and 11 years

Nilüfer Demirsoy, Omur Sayligil

From the Department of History of Medicine and Ethics, Faculty of Medicine, Eskisehir Osmangazi University, Eskisehir, Turkey

Correspondence: Dr. Nilüfer Demirsoy · Department of History of Medicine and Ethics, Faculty of Medicine, Eskisehir Osmangazi University, Eskisehir 26480, Turkey · T: +902222290170 · nilufer\_p2@hotmail.com · ORCID: <http://orcid.org/0000-0002-2647-0807>

Ann Saudi Med 2016; 36(4): 269-281

DOI: 10.5144/0256-4947.2016.269

**BACKGROUND:** There is increasing recognition of the importance of obtaining children's reports of their health, but significant challenges remain in accomplishing these goals in a systematic, community-based approach.

**OBJECTIVES:** The aim of study was to evaluate the validity and reliability of the culturally adapted Turkish version of the "Child Health and Illness Profile – Child Edition (CHIP-CE) (6-11) for children 6 to 11 years of age.

**DESIGN:** Cross-sectional analytical study conducted at Eskisehir Osmangazi University, Faculty of Medicine, Department of Pediatrics, Eskisehir, Turkey.

**SETTING:** Children's health and diseases clinic.

**PATIENTS AND METHODS:** For the purpose of this study, face-to-face interviews were conducted with inpatients (children aged between 6 and 11 years staying in the hospital) and healthy children (children aged between 6 and 11 years attending a private elementary school in the spring semester of 2010-2011). The Turkish version of CHIP-CE (6-11) was administered after the original version of CHIP-CE in English was translated into Turkish, and then back translated into English. All steps in the cultural adaptation process were undertaken meticulously by an expert committee. Confirmatory factor analysis (CFA) was conducted to test construct validity. The Cronbach's alpha and item-total correlations were used to evaluate internal consistency for reliability testing.

**MAIN OUTCOME MEASURES:** Domain scores on the CHIP-CE questionnaire, Cronbach's alpha and item-total correlations.

**RESULTS:** The Turkish version of CHIP-CE (6-11) was administered to 235 children, including 109 (46.4%) girls and 126 (53.6%) boys receiving inpatient treatment in the hospital, and 194 healthy children, including 89 (45.9%) girls and 105 (54.1%) boys. The mean (standard deviation) age was 6.9 (1.6) years in the group of children receiving inpatient treatment, and 9.2 (1.6) years in the healthy children. In the reliability testing of the CHIP-CE form, Cronbach's alpha was 0.79 in children receiving inpatient treatment, and 0.80 in healthy children. These values indicate excellent reliability. The CFA measurement model produced results consistent with standards:  $\chi^2=185.76$   $df=160$   $P=.07986$   $RMSEA=0.026$  in the children receiving inpatient treatment, and  $\chi^2=180.20$   $df=109$   $P=.00002$   $RMSEA=0.058$  in healthy children.

**CONCLUSION:** CHIP-CE proved to be a reliable and valid measurement instrument for children receiving treatment for various diseases and healthy children. The internal consistency of the Turkish version of CHIP-CE is acceptable.

**LIMITATIONS:** The sample, although large and diverse, was self-selected and does not represent the population of children in Turkey.

There is increasing recognition of the importance of obtaining children's reports of their health, but significant challenges remain to accomplish this in a systematic, community-based manner. Although health is often evaluated by classical health variables produced from biomedical models, it is a complex concept with various components. The WHO has stated that improving the health of children and adolescents aged between 6-17 years is also important for future community health. The evaluation of life quality in adults is well-known and has been included in clinical research for a long time, while the requirement to measure life quality in children and the search for methods has emerged more recently with changes in epidemiological characteristics in childhood diseases. Measurements of life quality in children emphasize the significance of the views of children on their ability to adapt to difficult conditions. Focusing on life quality at early ages is thought to lessen life quality problems in the adult years.

The active use of this concept in clinics difficult for various reasons. The density of patients and the lack of focus on a patient-oriented holistic approach, clinical conditions, functional ability, psychosocial well-being, social support condition and life satisfaction are system-based problems. Not evaluating the social and psychological effects to the same extent as the physiological and biochemical effects of the disease due to the effectiveness of medical treatment may downgrade the treatment process or may render it unsuccessful. Multidimensional evaluations that may be conducted on life quality may serve different purposes such as planning new health policies, choosing suitable approaches for individuals, decreasing the duration of hospital stay and treatment costs, and increasing the productivity of patients and their relatives by adding them to the work force.

Quality of life focuses on how an individual perceives his/her own life in the culture and system of values he/she lives in. This definition suggests that quality of life is an individual's subjective perception of his/her health.<sup>1</sup> Children's quality of life entails a different approach and different measurement instruments that focus on the child-specific life cycle (i.e. preschool, school and adolescence periods). The measurement of quality of life does not produce only quantitative results, but also subjective qualities.<sup>2</sup> The aim of measurement is to find out to which extent children are satisfied with their physical, psychological and social functions and unsatisfied with any deficiencies.

In the medical care of children, it is paramount to assess the degree of social and family support as well as

the concomitant negative and positive effects of illness on patient outcomes. It is a part of health care services to enable children, not mature yet in psychological and physical terms, to get engaged in the treatment processes (medical interventions) that change their bodies and lifestyles, and to ensure that they obtain positive outcomes. Health care team members are responsible for maintaining and improving the health conditions of healthy children or children discharged from the hospital as healthy individuals. Instruments developed for identifying children's quality of life are significant tools at the disposal of health care teams.

Today, in many parts of the world, there are assessment instruments actively used and continuously developed for both healthy and unhealthy children. These assessment instruments are used after being culturally adapted for children in the same age group in diverse parts of the world.

Validity and reliability measurement instruments developed so far have defined a limited number of criteria to assess the quality of life of children. The data obtained should both reflect the acceptable definition of quality of life and highlight negative factors. The assessment instruments should be multi-dimensional and absolutely contain social well-being factors. Short and user-friendly forms, which are valid for all children in a specified culture and pay heed to developmental stages of children, should be used for quality-of-life assessment. In the assessment of children's quality of life, the developmental framework and age are important factors. It is a highly subjective experience for children to evaluate their own well-being during the development of their cognitive skills and behaviors.

The effectiveness of illustrations in the materials used for the education of children is usually of particular importance. Children's perception and self-identification of characters are generally used effectively for problem-solving and education purposes. Illustrations potentially substitute words or sometimes fulfill the function of interpretation to indicate things to do. Children that interpret a text through illustrations are expected to yield benefits because, by doing so, they put creativity and visual perception at the disposal of mental development. Children develop more advanced skills of comprehension by reinforcing learning thanks to thoughts and knowledge they acquire and produce through illustrations. Research has shown that children like the pictures that are suitable for their age and interests. With the combined use of texts and pictures, it is possible to create entertaining, informative and educative illustrations to make children learn new concepts.<sup>3,4</sup>

Rebok et al conducted a three-stage study in 2001

with children 5 to 11 years old to develop and illustrate the Child Health Illness Profile-Child Edition (CHIP-CE) questionnaire. In the first study, the researchers identified how to draw the attention of children and enable them to focus on the construction of questions related to the perception of health. Characters were identified and actions were planned based on illustrations. The second study concentrated on how to transform this form into a format that is most easily understood by children. The third study dealt with how to determine the scaling in Likert-type form and how to score each choice in an item. For this purpose, the researchers worked with 114 children. They indicated that the form obtained could be comfortably used for children 6 to 11 years old.<sup>5</sup>

What distinguishes the CHIP-CE questionnaire from many other quality-of-life assessment instruments are particularly the use of illustrations and the use of circles in different sizes that allow children to express themselves through visual perception in a given situation. In our country, there are a limited number of assessment instruments developed or culturally adapted for this purpose.<sup>2,6-9</sup> The aim of study was to evaluate the validity and reliability of culturally adapted Turkish version of the CHIP-CE developed by Riley in 2001.

## PATIENTS AND METHODS

This was a descriptive study to assess the quality of life of children receiving inpatient treatment and in children defined as healthy. The study was conducted between April and November 2011 in children 6 to 11 years old, receiving inpatient treatment in the Children's Health and Diseases Clinic, Pediatric Surgery Clinic and Adult Orthopedic Clinic in the Faculty of Medicine at Eskişehir Osmangazi University (ESOGU), Turkey. The Clinics of Pediatric Oncology and Pediatric Infections were not included in the study since by their nature they are not open to visitors. We contacted all patients that underwent inpatient treatment in the clinics between given dates. The rate of participation in the study was 79.74%. The remaining 20% consisted of patients that did not consent to participate in the study, patients that did not fill out the form completely, patients whose health condition was not good enough to complete the form, or patients that stayed in more than one hospital in the treatment process. The number of children aged between 6 and 11 that agreed to take part in the study was 235. The group of healthy children consisted of children aged between 6 and 11, studying in a private education institution in the spring semester of 2010-2011 academic year who volunteered to participate. It was a prerequisite that the children understood and spoke Turkish, and that their parents gave permission for their participation. The

questionnaire forms were distributed to 230 children in the school and completed by 194 children. The response rate was 84.34% in the healthy children group.

Inclusion criteria:

- Child aged between 6 and 11 years,
- Child and legal guardian gave permission and consent to complete the questionnaire,
- Child had no physical disabilities such as visual and hearing impairment that prevented him/her from answering the questions,
- Child had adequate cognitive skills,
- If hospitalized, child was receiving inpatient treatment.

Exclusion criteria:

- Child did not have capacity to answer the questions,
- Child refused to take part in the study, and
- Children whose legal guardians did not consent to their inclusion in the study.

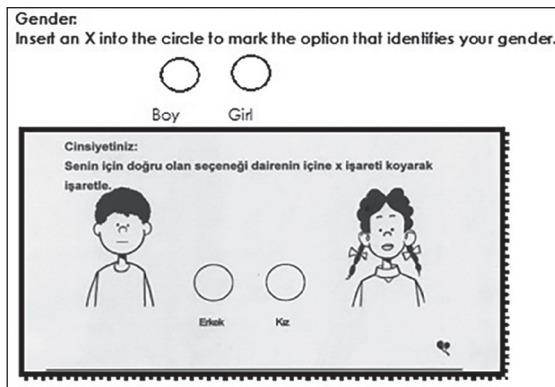
### *Data-collecting instruments and methods*

According to the definition of the World Health Organization (WHO), health not only refers to the condition of the lack of illness or disability, but to the condition of thorough well-being in physical, mental and social terms. Almost all definitions of quality of life encompass these components.

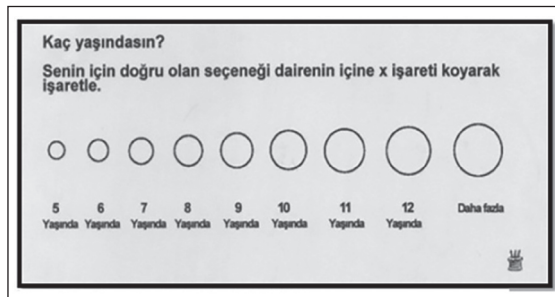
Defining children as a special group, WHO recommends that data-collecting instruments used in studies conducted with children should be suitable for their cognitive condition.

The CHIP-CE was preferred in this study because of various reasons. First of all, the instrument includes cartoons specifically designed for children and figures that facilitate the child's perception, which together contribute to effectiveness of the study. The parameters in CHIP-CE cover different areas. It is important that the instrument allows an all-round assessment of the child with the inclusion of various factors. The instrument enables the investigator to define how children are affected by environmental factors when they are ill and healthy, and to explain any findings of illness.

The CHIP-Child Edition is a self-report quality-of-life assessment instrument for evaluating the health status of children 6 to 11 years old. The child self-report form contains 48 questions. The CHIP is a quality-of-life instrument that assesses factors such as satisfaction, comfort, resilience (resistance and flexibility), risk avoidance and achievement (i.e. the factors that have an effect on health status) in children receiving health care or affected by these systems in school education. The last four weeks were taken into consideration to assess the signs of illness and well-being in children, and the effects of these signs on their behavioural problems, school suc-



**Figure 1.** An example of questions on the Child Health and Illness-Child Edition.



**Figure 2.** An example of questions in the CHIP-CE (How old are you?, Insert an X into the circle to mark the option that shows your age).



**Figure 3.** An example of questions in the CHIP-CE (How often did you feel anxious in the last 4 weeks?).

cess, and attitudes towards family members and peers. The five-point Likert scale is used in the form to define the frequency of signs. Pictures are used in item to illustrate types of reaction. Circles in various sizes (from small to large) are used for each answer choice. It is possible that children read and answer questions on their own, or researchers assist them to read and an-

swer. Children in the first grade and older are able to complete the form themselves easily (**Figures 1-3**).

We obtained permission from the Department of Population, Family and Reproductive Health, Bloom School of Public Health, John Hopkins University to use the form, and received further information from the same institution for the evaluation and analysis of the data collected through this form.

There are a limited number of other health-related pediatric quality-of-life instruments, whose validity and reliability testing was conducted for Turkish children<sup>7,10-14</sup> These instruments are presented in **Table 1**.

**Data-collecting method**

After the cultural adaptation, the form was finalized, a preliminary study was conducted, as a result of which final changes were made on the form. The data were collected in face-to-face interviews with children. The children capable of completing the form on their own were told about the process of replying to the questions. We confirmed that they were able to complete the form completely and properly. Furthermore, an additional questionnaire form prepared on the basis of the literature was used to determine demographic characteristics and other factors that affect quality of life.

**Cultural adaptation and validity and reliability of assessment tools for the quality of life**

Language is an acquired cultural feature of a society, and a prism that speakers of a language need to define the world. All efforts for cultural adaptation of the assessment instruments for the quality of life concentrate on achieving what is closest to reality. Cultural adaptation, not limited to translation, means finding the cultural equivalent of the concepts represented by the words in the source language. Language is important in cases where a culturally adapted instrument is used for the purpose of reducing the risk of possible prejudice.<sup>15,16</sup> What the instrument measures plays a guiding role in the cultural adaptation process.

The four-step model developed by Hui and Triandis is the most commonly used method for ensuring the intercultural equivalence of assessment instruments for the quality of life.<sup>17</sup> In this model, each step is a prerequisite to the succeeding step.

1. Conceptual/functional equivalence: This is an indispensable prerequisite. Semantic equivalence does not guarantee the cultural appropriateness of a questionnaire because sentences with the same meaning may not refer to the same concept.
2. Operational equivalence
3. Item equivalence

**Table 1.** General and illness-specific pediatric quality of life instruments whose reliability and validity testing is conducted in Turkish.\*

Instrument	Translated by	Domains Measured by Instruments						Item
		Physical	Psycho-logical	Social	School	Environ-ment	Personal Care	
Child Health Questionnaire	1998, Landgraft 2001, Özdoğan <sup>13</sup>	✓	✓	✓	✓		✓	CHQ PF50
KIDSCREEN-52	1998, Ulrike Ravens-Sieberer 2013, Bekir Fatih and Ahmet Fidan <sup>15</sup>	✓	✓	✓	✓	✓	✓	52
KINDL	2004, Eiser <sup>11</sup> 2008, Eser et al. <sup>2</sup>	✓	✓	✓	✓			24
Pediatric Quality of Life Inventory version 4.0	1999, Varni et al. 2005, Çakın Memik, Üneri <sup>16</sup>	✓	✓	✓	✓	✓	✓	23
Pediatric Quality of Life Inventory version 4.0 (Hematology Module Parent Inventory)	2000, Varni et al. 2013, Meltem Kürtüncü Tanır, Sema Kuşuoğlu <sup>17</sup>	✓	✓	✓	✓	✓	✓	25
Pediatric Asthma Quality of Life Questionnaire (PAQLO)	1996, Juniper EF et al. 2004, Yüksel et al. <sup>14,18</sup>	✓	✓	✓	✓		✓	
Attention Deficit Hyperactivity Disorder Quality of Life Measurement Instrument (AD/HD-QLM)	2004, Dolgun et al. <sup>19</sup>	✓	✓	✓	✓	✓		

\* In the column adjacent to the column of instruments, the first line presents the persons that developed the instruments and the second line presents the persons that prepared the Turkish version.

4. Scalar equivalence

In general terms, cultural adaptation consists of two stages: translation and evaluation of the instrument through psychometric tests. The main prerequisite on which people involved in cultural adaptation agree is "conceptual equivalence".<sup>18</sup>

*Techniques used in data analysis and evaluation*

Internationally acknowledged steps were followed for the cultural adaptation and subsequent reliability and validity testing of the CHIP-CE.<sup>19-22</sup> The process of adaptation into Turkish consisted of the following steps:

1. Permission was obtained from Starfield et al,

**Table 2.** The distribution of sociodemographic characteristics of children (ages 6-11).

	Children receiving inpatient treatment (N=235)		Healthy children (N=194)	
	Number (n)	Percentage (%)	Number (n)	Percentage (%)
<b>Sex</b>				
Girl	109	46.4	89	45.9
Boy	126	53.6	105	54.1
<b>Hospital department</b>				
Pediatrics	193	82.1	-	-
Orthopedics	28	11.9	-	-
Pediatric surgery	14	6.0	-	-
<b>Educational stage</b>				
Doesn't go to school	9	3.8	-	-
Preschool	7	3.0	14	7.2
Primary school 1st year	23	9.8	22	11.3
Primary school 2st year	51	21.7	12	6.2
Primary school 3rd year	32	13.6	55	28.4
Primary school 4th year	39	16.6	27	13.9
Primary school 5th year	44	18.7	64	33.0
Primary school 6th year	27	11.5	-	-
Primary school 7th year	3	1.3	-	-
<b>Mean age</b>	<b>8.9 (1.6)</b>		<b>9.2 (1.6)</b>	
<b>Educational status of the mother</b>				
No education	9	3.8	1	.7
Primary education	113	48.1	3	2.2
Secondary education	32	13.6	2	1.5
Upper secondary education	45	19.1	21	15.7
Undergraduate	18	7.7	77	57.5
Graduate	4	1.7	30	22.4
I don't know	14	6.0	-	-

who developed the form, and the Department of Population, Family and Reproductive Health, Bloomberg School of Public Health, John Hopkins University. Then, permission was received from ESOGU Board of Ethics, ESOGU Faculty of Medicine Administration and ESOGU Faculty of Medicine Program in Child Health and Diseases.

- The English text was translated into Turkish independently by two persons.
- The two translations were combined to develop a single instrument by a physician and a board of experts, who have a good command of English.
- A bilingual translator (who has native proficiency in Turkish and English) was asked to back translate the merged text into English.
- A Turkish working group of experts assured that the form back translated was compared with the original English form and made the preparations required for the start of a cognitive-conceptual discussion of the Turkish version.
- The finalized Turkish version was administered to 10 school children for cognitive-conceptual evaluation, and the Turkish pilot version of CHIP was obtained after modifications were made on Turkish statements, based on each suggestion related to item construction.
- The instrument was administered to a sample representing the school children aged between 6 and 11 years.
- The data collected were analyzed.
- The instrument was tested for reliability and validity and then evaluated by appropriate statistical methods (analysis of variance, confirmatory factor analysis (CFA) and Cronbach's alpha for reliability).

SPSS (Statistical Package for Social Sciences) (SPSS 20.0, SPSS, Chicago, IL) was used for data analysis, and the value of  $P < .05$  (two-tailed) was considered statistically significant.

In the study, when a comparison was required, Kruskal Wallis analysis of variance was used to determine whether the data showed a normal distribution when there were more than two groups, and Sigma SAT 3.5 statistical software was used to identify the differences between the groups. A series of scores was obtained by structural equation model and LISREL software model, which indirectly confirmed the validity of items and the instrument. The items in the instrument were tested for validity and reliability by CFA to confirm the appropriateness of a suggested or tested theoretical model. The literature shows that CFA is a method

generally used after classical factor analysis.<sup>23,24</sup>

One of the most important advantages of CFA is that it provides various types of fit indexes for evaluating the fitting with data of the model defined theoretically. For the purpose of this study, CFA was used and structural equation models were constructed. After the data were collected, the statistical software SPSS 20.0 was used to enter and analyze the data, and LISREL 8.72 was used for (CFA) and the construction of models.

## RESULTS

The mean (standard deviation) age of children receiving inpatient treatment (aged 6-11 years) was 8.9 (1.6) years, and that of healthy children aged 6-11 years was 9.2 (1.6) (Table 2). In children receiving inpatient treatment, 126 (53.6%) participants were male and 109 (46.6%) participants were female. In healthy children, 105 (54.1%) participants were male and 89 (45.9%) participants were female. (Table 2) The education level was lower in children receiving inpatient treatment than in the healthy children, probably due to illness and other social causes.

The distribution of answers to the question "How often did you brush your hair in the last four weeks?" is as follows in the group of children receiving inpatient treatment: 25 (10.6%) never, 82 (34.9%) sometimes and 128 (54.5%) always. The distribution of answers to the same question is as follows in the group of healthy children: 27 (13.9%) never, 31 (16.0%) sometimes and 136 (70.1%) always.

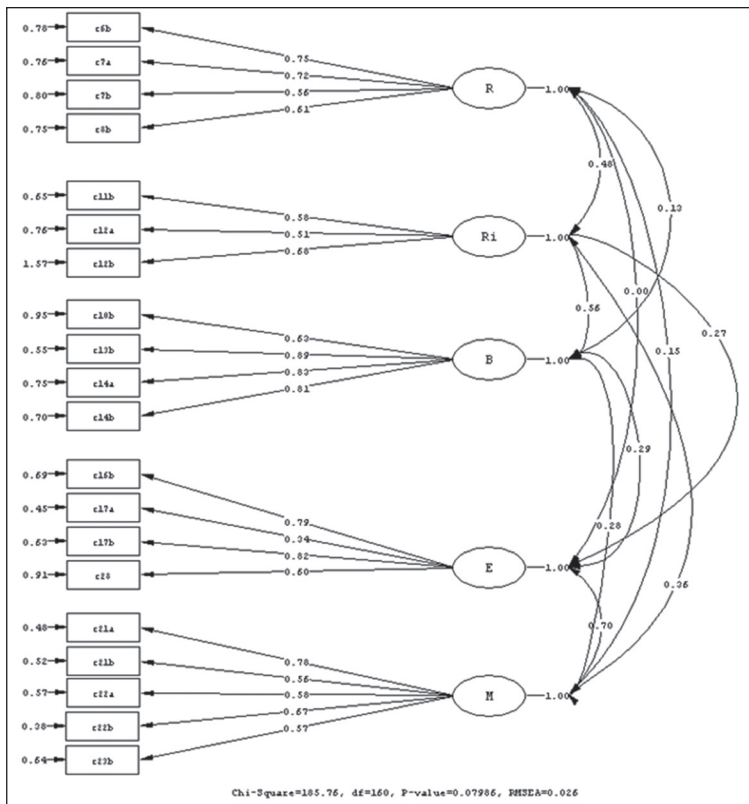
On the CHIP-CE form, there is no part for disorders of participants. For this purpose, the diagnoses in the files of children were recorded and classified according to the disorders module in the Parent Report Form of CHIP-CE 76/AE. Some disorders placed under each module were as follows. Acute minor illnesses: upper respiratory track infection, fever, toothache; Acute major illnesses: foot fracture, poisoning, severe injuries, pneumonia; Recurrent illnesses: Diabetes mellitus, juvenile rheumatoid arthritis, thalassemia, multiple sclerosis, asthma; Long-term medical illnesses: chronic kidney disease, heart diseases, leukemia, growth retardation, thyroid; Long-term surgical illnesses: segmental fractures in feet and legs; Psychosocial disorders: Suicide, depression. The breakdown of most commonly encountered illnesses was as follows: diabetes 17 (7.2%), kidney diseases 17 (7.2%) and arm fractures 17 (7.2%) in surgical clinics.

### Validity and reliability testing, and confirmatory factor analysis

CFA was conducted to confirm certain factors in the original form with regard to construct validity, and some

**Table 2 cont.** The distribution of sociodemographic characteristics of children (ages 6-11).

	Children receiving inpatient treatment (N=235)		Healthy children (N=194)	
	Number (n)	Percentage (%)	Number (n)	Percentage (%)
<b>Educational status of the father</b>				
No education		3.4	-	-
Primary education	58	24.7	1	1.7
Secondary education	26	11.1	1	1.7
Upper secondary education	93	39.6	22	16.4
Undergraduate	30	12.8	72	53.4
Graduate	8	3.4	38	28.4
I don't know	19	5.1	-	-
<b>Employment status of the mother</b>				
Full-time	43	18.3	68	50.7
Part-time	13	5.5	44	32.8
Doesn't work, seeks a job	20	8.5	2	1.5
Disabled and doesn't work	6	2.6	-	-
Doesn't work and doesn't seek a job	138	58.7	8	13.4
Retired	-	-	1	.7
Part-time student	1	0.4	-	-
I don't know	1	0.4	1	.7
<b>Employment status of the father</b>				
Full-time	166	70.6	78	58.2
Part-time	25	10.6	51	38.1
Doesn't work, seeks a job	11	4.7	-	-
Disabled and doesn't work	2	0.9	-	-
Doesn't work and doesn't seek a job	2	0.9	-	-
Retired	14	6.0	4	3.0
Full-time student	-	-	1	.7
Part-time student	-	-	-	-
I don't know	15	6.4	-	-



**Figure 4.** Path diagram for the group of children receiving inpatient treatment (aged 6-11 years). R: comfort, Ri: risks, B: achievement, E: resilience, M: satisfaction.

items in the original form were not included in the factors in line with the results. The data were evaluated after these items were removed from the form.

For children receiving inpatient treatment, chi-square values and fit index values of the model obtained from the CFA are presented in **Figure 4**. The fit indexes confirmed the factors in the original form with respect to construct validity. The chi-square value was significant ( $\chi^2 = 185.76$ ,  $N = 252$ ,  $sd = 160$ ,  $P = 0.079$ ). The fit index values were as follows: RMSEA=0.026, SRMR=0.049, NFI=0.91, NNFI =0.98, CFI=0.98, GFI=0.93, AGFI=0.90. The fit index values indicate that the model had good fit.

For healthy children, the fit index of the model obtained from the CFA showed the chi-square values and fit index values presented in **Figure 5**. The factor loads and path diagram of the model are shown in the figure. The fit indexes of the model confirmed the factors in the original form with respect to construct validity. The chi-square value was significant ( $\chi^2 = 180.20$ ,  $N = 194$ ,  $sd = 109$ ,  $P = 0.00002$ ). The fit index values were as follows: RMSEA=0.058, SRMR=0.062, NFI=0.87, NNFI =0.92, CFI=0.94, GFI=0.90, AGFI=0.86. The fit index

values indicate that the model had good fit.

In the reliability and item analysis of the Child Health and Illness-CHIP-CE form, the total correlation of items and Cronbach's alpha coefficient of internal consistency of factors were calculated to test the reliability of domains examined in the CFA. The mean scores of items, total and mean scores of factors and standard errors collected from the groups of ill children and healthy children are provided in **Table 3** and **Table 4**. The state of being ill differed by sex and health status. The CHIP-CE form results indicate that the mean scores for domains are higher in healthy children than in the group of children receiving inpatient treatment. Given the present and past illness experience of the group of children under treatment, the difference in scores is significant.

In the CHIP-CE form, the highest score was 20, and higher score indicates more discomfort. For the domain of achievement, the highest score was 20, and the higher score indicates higher success. Risks refer to behaviors that are expected to increase the possibility of illness and injuries. The highest score is 15, and higher score indicates lower risks. Flexibility involves the behaviors targeted at personal protection after a disease or injury. The highest score was 20, and a higher score indicates more flexibility. Satisfaction refers to perceived health and well-being. The highest score was 25, and a higher score refers to higher satisfaction. The domain of comfort refers to intervention in certain emotional and physical feelings.

The total scores of domains in the CHIP-CE form indicate that the participants in the group of children under treatment obtained higher scores. The group of children under treatment got higher total scores than healthy children particularly with respect to flexibility and satisfaction domains. In the reliability and validity analysis of the Child Health and Illness-CHIP-CE form, the evaluation of all items indicates that Cronbach's alpha is 0.79 for children receiving inpatient treatment and 0.80 for healthy children (**Table 5**).

## DISCUSSION

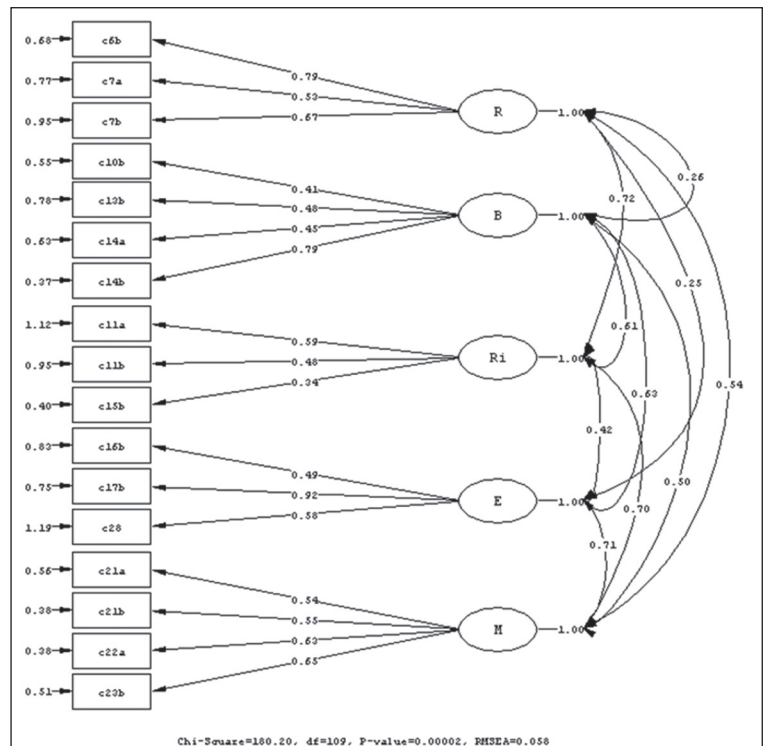
Our findings differ in some respects and are consistent in others with the results of previous studies. Mean scores of domains are lower in studies conducted with patients<sup>1,25-27</sup> and higher in studies with healthy individuals.<sup>28-30</sup> **Tables 6 and 7** present the findings of studies conducted with children using the CHIP-CE questionnaire. The first study with the original version of the form was carried out by Forrest et al in 2004.<sup>1</sup> The participants were patients under observation for 12 months. The sample consisted of 384 children in the 6-11 year age group who were under clinical observation for 12



months in the Rhode Island Medicaid program and in health care organizations in Northern California. The mean scores in the dissatisfaction and discomfort domains were quite low.<sup>1</sup> After cultural adaptation and CFA for validity and reliability testing of the Turkish instrument, a group of questions mostly related to the domain of risks were excluded from the form. That is why total scores are different from those in the original form. The mean values in our study are different from those in Forrest et al's study. While the mean scores of flexibility and risks domains were higher in our study, while the mean scores of satisfaction, achievement and discomfort domains were lower. The main reason is the difference in culture and different approaches adopted in health care institutions.

Riley et al used the CHIP-CE form to assess 1500 hyperactive children aged between 6 and 18 years in 2006, and found that the mean values were lower, particularly in the risk avoidance and achievement domains.<sup>30</sup> Our findings were consistent with Riley et al's study, excluding the risks domain, as the Cronbach's alpha was >0.70 in general reliability testing of the study.

Schacht et al used the CHIP-CE form to assess children in the 6-15 year age group, and found that the



**Figure 5.** Path diagram for the children in the health patient group (aged 6-11 years). R: comfort, Ri: risks, B: achievement, E: resilience, M: satisfaction.

**Table 3.** Domains, means and standard errors on the Child Health and Illness-Child Edition form for children receiving inpatient treatment and children in the healthy children (aged 6-11 years.).

Domain	Children receiving inpatient treatment			Healthy children		
	Total group N=235	Boys n=126	Girls n=109	Total group N= 194	Boys n=105	Girls n= 89
Comfort	3.73 (.793)	3.76 (.795)	3.70 (.794)	3.85 (.839)	3.93 (.742)	3.74 (.934)
Achievement	3.05 (.718)	2.95 (.716)	3.17 (.705)	4.27 (.659)	4.25 (.656)	4.29 (.666)
Risks	4.03 (.834)	3.95 (.838)	4.13 (.822)	4.15 (.701)	4.16 (.677)	4.14 (.731)
Resilience	3.99 (.760)	3.91(.772)	4.08 (.740)	3.78 (.858)	3.76 (.834)	3.80 (.891)
Satisfaction	4.25 (.708)	4.18 (.712)	4.33 (.698)	4.28 (.682)	4.29 (.682)	4.26 (.685)

**Table 4.** Domains, total scores and standard deviations on the Child Health and Illness-Child Edition form for children receiving inpatient treatment and healthy children(aged 6-11).

Domain	Children receiving inpatient treatment			Healthy Children		
	Total group N=235	Boys n=126	Girls n= 109	Total group N= 194	Boys n=105	Girls n=89
Discomfort	14.94 (3.175)	15.05 (3.183)	14.81 (3.177)	11.55 (2.518)	11.81 (2.226)	11.23 (2.804)
Achievement	15.28 (3.592)	14.76 (3.580)	15.88 (3.529)	17.10 (2.638)	17.02 (2.625)	17.19 (2.666)
Risks	12.11 (2.503)	11.85 (2.516)	12.40 (2.468)	12.47 (2.104)	12.50 (2.033)	12.44 (2.195)
Resilience	15.97 (3.043)	15.65 (3.088)	16.34 (2.960)	11.34 (2.576)	11.28 (2.502)	11.40 (2.674)
Satisfaction	21.26 (3.541)	20.92 (3.561)	21.66 (3.493)	17.13 (2.730)	17.19 (2.731)	17.07 (2.743)

**Table 5.** Cronbach's alpha results of the total group for the reliability analysis of domains of the Child Health and Illness-Child Edition questionnaire for children receiving inpatient treatment and the healthy children.

Domain	Children receiving inpatient treatment n=235	Healthy children n=194
Discomfort	0.688	0.614
Achievement	0.768	0.651
Risks	0.535	0.431
Resilience	0.691	0.551
Satisfaction	0.791	0.752
All items	0.791	0.804

results related to domains and subdomains were similar to the results in the original form. They suggest that the CHIP-CE form can be used effectively for quality-of-life assessment for children in this age group, diagnosed with hyperactivity by psychometric instruments. Reliability testing was not conducted.<sup>26</sup>

Wehmeier et al worked with 794 individuals (611 children, 183 adolescents) in the study where they used the attention-deficit hyperactivity disorder (ADHD) assessment tool and the CHIP-CE form to determine the effects of atomoxetine therapy on ADHD and to assess health-related quality of life in 2010. While impairment for family involvement, satisfaction and academic performance was more frequent in the group of adolescents than the group of children ( $P < .05$ ) in the beginning, the atomoxetine therapy had significant impacts on the subdomain of risks in both groups.<sup>27</sup>

Escobar et al used the CHIP-CE form to assess the quality of life in 2010 and found that the CHIP-CE is an effective measurement instrument for assessing the quality of life in children with ADHD.<sup>27</sup> Wehmeier et al had a sample of 894 individuals in a study in 2012 based on the hypothesis that ADHD causes significant impairment in health-related quality of life. In the beginning, there were slight differences of impairment between subdomains. The atomoxetine therapy caused significant changes in the domain of risks and its subdomains in both groups.<sup>31</sup>

The present study did not include child patients with ADHD. However, based on similar studies, we conclude that the Turkish version of the instrument may be used to assess the effectiveness of the treatment of such disorders since the instrument had high scores in validity testing.

In the present study, the mean values suggest that there are obvious differences between the healthy and

ill children with regard to the domains of the CHIP-CE form. Except for the domain of flexibility, the mean scores of healthy children were higher than the scores of children receiving inpatient treatment. The fact that the score of flexibility is higher in ill children may be because the experience of illness enabled these children to adapt more easily to changes in lifestyle. There are differences in total scores and mean scores between the two groups. Illness has negative impacts on all individuals, including children.

In addition to the foregoing studies, the CHIP-CE form was used by Döpfner et al in their study of 2006 related to ADHD,<sup>32</sup> by Prasad et al to study the perceptions related to ADHD in pediatric patients in England in 2007 based on the views of clinicians, parents and children,<sup>33</sup> by Dell'Agnello et al to assess the effectiveness of atomoxetine in the treatment of ADHD and oppositional defiant disorder (ODD) symptoms in pediatric patients that did not respond to previous psychological interventions and parent support,<sup>34</sup> by Martényi et al to assess the diagnosis, comorbidity, treatment patterns and quality of life in children of Asian and Central and Eastern European origin aged 6 to 17 years with symptoms of ADHD in a 12-month retrospective and observational study in 2012,<sup>35</sup> by Svanborg et al to assess the effects of atomoxetine on the quality of life in Swedish children and adolescents with ADHD in a 10-months study in 2009,<sup>36</sup> and by Piqueras et al to assess weight categories based on body-mass index and quality of life in children aged 8-12 years in 2012.<sup>37</sup>

Rebok et al conducted a three-stage study with children aged between 5 and 11 years to develop and illustrate the CHIP-CE form in 2001. In the first stage, to construct questions related to perception of health, they considered how to draw children's attention and enable them to focus, and to this end, designed illustrated characters and their actions. In the second stage, the researchers concentrated on how to develop and construct questions that are most easily understood by children. In the third stage, they determined the intervals between choices in Likert-type items and how to formulate and score the options in the most appropriate way. For this purpose, they worked with 114 healthy children, and indicated that the form could be used for children aged between 6 and 11 years.<sup>38</sup>

What distinguishes the CHIP-CE form from many other instruments used in quality-of-life assessment are the illustrations used in items and the circles in different sizes that enable children to perceive visually how to express themselves. Starfield et al worked with 673 healthy children aged 6 to 11 years in 2002 to develop the original form, and assessed the effect of child's so-

**Table 6.** The comparison of data related to ill children with studies in the literature: Cronbach's alpha values as distributed by domains of the Child Health and Illness-Child Edition questionnaire.

	Forrest CB. 2004 N=384	US Version (N=1477) Riley 2006 Children with ADHD			PM. Wehmeier 2010 N=794 Children with ADHD		Schacht 2011 ADHD 6-15 Age N=794	Turkish version III Children (n=235)	Turkish version III children (n=235)	Turkish version III children Cronbach's alpha
		Cronbach's alpha	Male	Female	Children (n=611)	Adolescents (n=183)				
Satisfaction	4.31		32.9 (14.3)	31.6 (15.0)	34.9 (13.88)	32.9 (14.49)	34.4	21.26 (3.541)	4.25	0.791
Discomfort	4.10		42.7 (10.6)	40.8 (10.4)	43.3 (10.75)	44.7 (11.00)	43.7	14.94 (3.175)	3.73	0.688
Flexibility	3.61	>0.70	35.9 (12.2)	36.7 (12.5)	36.5 (11.91)	34.5 (12.33)	36.0	15.97 (3.043)	3.99	0.691
Risks	3.77		29.3 (13.5)	32.8 (13.5)	30.6 (14.75)	29.0 (14.18)	35.7	12.11 (2.503)	4.03	0.535
Achievement	3.96		30.4 (10.8)	30.0 (10.0)	31.0 (10.26)	28.9 (10.71)	30.5	15.28 (3.592)	3.05	0.768
Total	-		-	-	-	-	-	-	-	-

**Table 7.** The comparison of data related to healthy children with studies in the literature\*: Cronbach's alpha values as distributed by domains of the Child Health and Illness-Child Edition questionnaire.

	US Version (n =1708) Riley 2004					Portuguese version (N=225) Rodrigues 2010	Spanish version (N=979) Maria Estarada 2012	Turkish version healthy children (N=194)				Turkish version healthy children Cronbach's alpha	
	Cronbach's alpha	Male	Female	Aged 6-7	Aged 8-11	Cronbach's alpha		6-7A	8-12A	6-7A	8-12A		
Satisfaction	0.81	49.64 (10.68)	50.34 (9.32)	5.73 (10.17)	49.31 (9.83)	0.83	0.79	53.3	50.2	53.5	47.5	17.13 (2.730)	0.752
Discomfort	0.82	50.90 (9.62)	49.18 (10.27)	47.90 (11.76)	50.88 (9.03)	0.79	0.79	48.7	53.1	47.8	49.8	11.55 (2.518)	0.614
Flexibility	0.70	49.66 (10.46)	50.31 (9.54)	49.70 (10.48)	50.15 (9.78)	0.67	0.60	48.1	51.9	49.1	50.0	11.34 (2.576)	0.551
Risks	0.82	46.38 (11.38)	53.20 (7.26)	53.00 (7.75)	4.43 (10.68)	0.71	0.73	51.7	47.9	55.0	51.2	12.47 (2.104)	0.431
Achievement	0.74	49.39 (10.54)	50.55 (9.45)	51.71 (10.30)	49.31 (9.80)	0.77	0.67	51.5	50.3	52.1	48.3	17.10 (2.638)	0.651
Total	-	-	-	-	-	-	-	-	-	-	-	-	0.804
<b>Fit Criteria</b>	-	-	-	-	-	-	-	<b><math>\chi^2:3.722</math> <math>df:892.00</math> <math>RMSEA:0.058</math></b>				<b><math>\chi^2:180.20</math> <math>df:109</math> <math>RMSEA:0.057</math></b>	

\*This table does not present mean scores but total scores and Cronbach's alpha values obtained in US, Portuguese and Spanish versions.

cial class on quality of life. The study does not present mean values and reliability analysis results for domains of the CHIP-CE form.<sup>39</sup>

Riley et al performed validity and reliability fasting for the original form with 1708 children aged between 6 and 11 years in 2001 and 2002. The domains they obtained as a result of the factor analysis were consistent with other related studies.<sup>28</sup> The Spanish version of the CHIP-CE form was used in the study conducted between 2002 and 2003 with 979 healthy children aged 6-12 years. As seen in **Table 7**, the results in that study are consistent with the Turkish version of the CHIP-CE form.<sup>29</sup>

The limitations were that the study was conducted in only one health care center, a treatment period of three months was determined for children receiving inpatient treatment, and healthy children were selected from only one school. Instrument validation is an ongoing process of knowledge accumulation. This first effort is limited in several ways. The sample, although large and diverse, is self-selected and does not represent the

population of children in the Turkey. Future research will be required to address all of these issues.

In our study, the Cronbach's alpha value was high with respect to both domains and all items in the analysis. This shows that the version adapted for the Turkish children can be used as a highly reliable form for children receiving inpatient treatment and healthy children. We suggest that this assessment instrument, tested for validity and reliability for children aged 6 to 11 years, be administered to children with a chronic disease in particular to evaluate effectiveness of the instrument and define the child's needs. The CHIP-CE form can be used in counseling centers for healthy children and by a professional health care team for ill children (i.e. children with diabetes, ADHD, acute and chronic kidney disease, heart diseases, juvenile rheumatoid arthritis, oncology patients, children in terminal stage disease, children with chronic and recurrent disease) in order to support their treatment processes. It would be useful to replicate the study to provide results for a larger population of healthy children.

## REFERENCES

1. Fidaner C. Health-Related Quality of Life (H-RQL): An Introduction Trial. İzmir I. Sağlıkta Yaşam Kalitesi Sempozyumu. 2004.
2. Eser E, Yüksel H, Baydur H, Erhart M, Saatli G. The Psychometric Properties of the New Turkish Generic Health-Related Quality of Life Questionnaire for Children (Kid-KINDL) Türk Psikiyatri Dergisi. 2008; 19(4): 409-417.
3. Gülpinar F. Visual Concepts, Illustration and Children's Books. Master Thesis. İstanbul. 2010.
4. Demirsoy N. Quality of Life for Children: "Child Patients' Book" Proposal For Children Staying In Hospital Throughout The Summary Of Literature' V. International Congress of Educational Research. 6-9 June 2013 Canakkale.
5. Rebok G, Riley A, Forrest C. Elementary school-aged children's reports of their health: A cognitive interviewing study. *Quality of Life*. 2001;10:59-70.
6. Özdoğan H, Ruperto N, Kasapçopur O, Bakkaloglu A, Arisoy N. The Turkish version of childhood assessment questionnaire (CHAQ) and the child health questionnaire (CHQ). *Clin Exp Rheumatol*. 2001; 19(23):158-162.
7. Dolgun G. The Development of a Quality of Life Assessment Instrument for Children Aged 8-12 with Attention Deficit and Hyperactivity Disorder. Doctoral Thesis. İstanbul University Institute of Medical Sciences, Department of Nursing. 2003; 35-48.
8. Yüksel H, Eser E, Çelik C, Akıncı G, Eser S. Reliability and Validity of the Turkish Version of the Pediatric Asthma Quality of Life Questionnaire. 1. National Health-related quality of life Program and Abstract Book. İzmir. 2004; 77.
9. Çakın Memik N. A Quality of Life Assessment Instrument for Children: Reliability and Validity Testing. Dissertation, Child and Adolescent Psychiatry. Kocaeli University. Medical Faculty. 2005.
10. Eiser C. Children With Cancer: The Quality of Life. Lawrence Erlbaum Associates, Incorporated. 2004. (<http://www.questia.com/library/104621853/children-with-cancer-the-quality-of-life>)
11. Eiser C, and Morse R. Quality-of-life measures in chronic diseases of childhood. *Health Technol Assess*. 2001;5:1-156.
12. Meral B.F, Fidan A. The Examination Of Psychometric Properties Of Kidscreen-Short Version On Children With Autism In Turkey. *International Journal On New Trends In Education And Their Implications*. 2013;(4):151-159.
13. Kürtüncü T.M, Kuguoglu S. Impact of exercise on the lower activity levels in children with acute lymphoblastic leukemia: a randomised controlled trial from Turkey. *Rehabilitation Nursing*. 2013;38(1):48-59.
14. Juniper E.F, Guyatt G.H, Feeny D.H, Gerrie P.J, Griffith L.E, Townsend M. Measuring quality of life children with asthma. *Qual Life Res*. 1996;5:35-46.
15. Riley A.W, Forrest C.F, Rebok G.W, Starfield B, Green B, Robertson J, Friello P. The Child Report Form of the CHIP-Child Edition Reliability and validity. *Med Care*. 2001; 42: 221-231.
16. Keenaghan C, Kilroe J. A Study on the Quality of Life Tool KIDSCREEN for children and adolescents in Ireland Results of the KIDSCREEN National Survey 2005. Published by The Stationery Office. Dublin. 2008; 6-10.
17. Eser E. Cultural adaptation of health-related quality of life measures. *Sağlıkta Birlik*. 2013; 1(2), 6-8 p.([http://www2.bayar.edu.tr/saglik/docs/sagliktabirlikim/2/6\\_8.pdf](http://www2.bayar.edu.tr/saglik/docs/sagliktabirlikim/2/6_8.pdf))
18. Bullinger M, Ravens-Sieberer U. General principles, methods and areas of application of quality of life research in children, *Praxis der Kinderpsychologie und Kinderpsychiatrie*. 1995;44(10), 391-99 p.
19. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health related quality of life measures: Literature review and proposed guidelines. *Clin Epidemiol*.1993; 46(12):1417-32.
20. Landgraf J.M, Maunsell E, Speechley K.N, Bullinger M, Campbell S, Abetz L, Ware J.E. Canadian-French, German and UK versions of the child health questionnaire: Methodology and preliminary item scaling results. *Qual Life Res*.1998; 7(5): 433-45.
21. Raat H, Botterweck A.M, Landgraf J.M, Hoogeveen W.C, Essink-Bot M.L. Reliability and validity of the short form of the child health questionnaire for parents (CHQ-PF28) in large random school based and general population samples. *J Epidemiology Community Health*. 2005; 59(1):75-82.
22. Ware J.E, Harris W.J, Gandek B. MAP-R for Windows: Multitrait/Multi-item Analysis Program-Revised User's Guide. Boston, MA: Health Assessment Lab.Sandra Shapshayj. Children's Rights and Children's Health Journal of Social Philosophy.1997;39(4):583-605.
23. Sümer N. Structural Equation Model: Basic Concepts and Cases. Türk Psikoloji Yazıları. 2000; 3 (6): 49-74.
24. Sencan H. Reliability and Validity in Social and Behavioral Measurements. Seckin Publications. Ankara. 2005; 686-688.
25. Riley AW, Coghill D, Forrest CB, Lorenzo MJ. Validity of the health-related quality of life assessment in the ADORE study: Parent Report Form of the CHIP-Child Edition. *Eur Child Adolesc Psychiatry*. 2006;15 Suppl (05.09.2015)

1:163-71.

- 26.**Schacht A, Escobar R, Wagner T, Wehmeier PM. Psychometric properties of the quality of life scale Child Health and Illness Profile-Child Edition in a combined analysis of five atomoxetine trials. *Atten Defic Hyperact Disord.* 2011;3(4):335-49.
- 27.**Wehmeier PM, Schacht A, Escobar R, et. Differences between children and adolescents in treatment response to atomoxetine and the correlation between health-related quality of life and Attention Deficit/Hyperactivity Disorder core symptoms: Meta-analysis of five atomoxetine trials. *Child Adolesc Psychiatry Ment Health.* 2010;6(4):30.
- 28.**Riley A.W, Forrest C.F, Starfield B, Rebok G.W, Robertson J, Green B. The parent report form of the CHIP-Child Edition. Reliability and validity. *Med Care.* 2004; 42: 210-220.
- 29.**Estrada M.D, Rajmil L, Serra-Sutton V, et. Reliability and validity of the Spanish version of the Child Health and Illness Profile (CHIP) Child- Edition. Parent Report Form (CHIP-CE/PRF) Health and Quality of Life Outcomes 20. 2010; 8(78):1-9.
- 30.**Rodrigues M.A, Apóstolo J.L.A. Portuguese adaptation of the Child Health and Illness Profile, Child Edition (CHIP-CE). *Revista de Enfermagem Referência III Série - n.º 2 - Dez.* 2010; 121-126.
- 31.**Wehmeier PM, Schacht A, Escobar R, Hervas A, Dickson R. Health-related quality of life in ADHD: a pooled analysis of gender differences in five atomoxetine trials. *Atten Defic Hyperact Disord.* 2012; 4(1):25-35.
- 32.**Döpfner M, Steinhausen HC, Coghill D. Cross-cultural reliability and validity of ADHD assessed by the ADHD Rating Scale in a pan-European study. *Eur Child Adolesc Psychiatry.*2006; 15 Suppl 1:146-55.
- 33.**Prasad S, Harpin V, Poole L. A multi-centre, randomised, open-label study of atomoxetine compared with standard current therapy in UK children and adolescents with attention-deficit/hyperactivity disorder (ADHD). *Curr Med Res Opin.* 2007; 23(2):379-94.
- 34.**[http://www.bayar.edu.tr/~saykad/eseryasamkalite.pdf\(03.09.2015\)-Eser E.,](http://www.bayar.edu.tr/~saykad/eseryasamkalite.pdf(03.09.2015)-Eser E.,) Perceived Health-Related Quality of Life.
- 35.**Martényi F, Treuer T, Gau SS. Attention-deficit/hyperactivity disorder diagnosis, comorbidities, treatment patterns, and quality of life in a pediatric population in central and eastern Europe and Asia. *Child Adolesc Psychopharmacol.* 2009;19(4):363-76.
- 36.**Svanborg P, Thernlund G, Gustafsson PA. Atomoxetine improves patient and family coping in attention deficit/hyperactivity disorder: a randomized, double-blind, placebo-controlled study in Swedish children and adolescents. *Eur Child Adolesc Psychiatry.*2009; 18(12):725-35.
- 37.**Piqueras JA, Orgilés M, Espada JP. Health-related quality of life across weight categories in childhood, *Gac Sanit.* 2012;26(2):170-3.
- 38.**Rebok G, Riley A, Forrest C. Elementary school-aged children's reports of their health : A cognitive interviewing study. *Quality of Life.* 2001;10:59-70.
- 39.**Starfield B, Riley AW, Witt WP, Robertson J. Social Class Gradients In Health During Adolescence. *J Epidemiol Community Health.* 2002; 56, 354-361.