# The Italian version of the Childhood Health Assessment Questionnaire (CHAQ) and the Child Health Questionnaire (CHQ)

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Key words: Italian Childhood Health Assessment Questionnaire (CHAQ), Italian Child Health Questionnaire (CHQ), cross cultural adaptation and psychometric evaluation, health related quality of life, juvenile idiopathic arthritis (JIA), healthy children.

# ABSTRACT

We report herein the results of the cross-cultural adaptation and validation into the Italian lan guage of the parent's version of two health relat ed quality of life instruments. The Childhood Health Assessment Questionnaire (CHAQ) is a disease specific health instrument that measures functional ability in daily living activities in chil dren with juvenile idiopathic arthritis (JIA). The Child Health Questionnaire (CHQ) is a generic health instrument designed to capture the physi cal and psychosocial well-being of children inde pendently from the underlying disease. The Ital ian CHAQ was already published in the literature and was therefore revalidated while the Italian CHO was fully cross culturally adapted with 3 forward and 3 backward translations, and than validated. A total of 1,192 subjects were enrolled: 404 patients with JIA (16% systemic onset, 31% polyarticular onset,21% extended oligoarticular subtype, and 32% persistent oligoarticular sub type) and 788 healthy children. The CHAQ clini cally discriminated between healthy subjects and JIA patients, with the systemic, polyarticular and extended oligoarticular subtypes having a higher degree of disability, pain, and a lower overall well-being when compared to their healthy peers. Also the CHQ clinically discriminated between healthy subjects and JIA patients, with the sys temic onset, polyarticular onset and extended oli goarticular subtypes having a lower physical and psychosocial well-being when compared to their healthy peers.

In conclusion the Italian version of the CHAQ-CHQ are reliable, and valid tools for the functional, physical and psychosocial assessment of children with JIA.

### Introduction

The aim of this study was to cross-culturally adapt and validate the Italian parent's version of the Childhood Health Assessment Questionnaire (CHAQ)(1) and Child Health Questionnaire (CHQ) (2) in a cohort of healthy children and in patients with juvenile idiopathic arthritis (JIA) being followed by the Italian members of the Paediatric Rheumatology International Trials Organisation (PRINTO). This project formed a part of a larger international survey conducted by PRINTO and supported by the European Union (contract BMH4 983531 CA) (3-5), whose scope is to evaluate the health-related quality of life in children with JIA as compared to their healthy peers.

# Patients and results

The methodology used is described in detail in the introductory paper of this supplement (6). The complete Italian version of the CHAQ- CHQ, with the corresponding lines of the original American-English questionnaires marked in the left column, is reproduced at the end of this paper.

In brief, after obtaining ethics committees approval of the respective participating institutions and the consent of at least one parent per child, children were recruited into a prospective study performed from April 1998 to March 2000, by the Italian members of PRINTO. Patients included children with JIA of either systemic onset, polyarticular onset, extended oligoarticular or persistent oligoarticular subtype (Durban criteria) (7). The controls consisted of healthy children (6 to 18 years of age) attending local schools and/or healthy sibling(s) of the JIA participants.

Demographic and clinical characteristics of the subjects (Table I)

A total of 1,192 subjects were enrolled: 404 patients with JIA (16% systemic onset, 31% polyarticular onset,21% extended oligoarticular subtype, and 32% persistent oligoarticular subtype) and 788 healthy children. The CHAQ-CHQ were completed in 80% of the cases by the mother (mean age  $39.3 \pm 6.0$ ), and in 20% of the cases by the father (mean age  $42.9 \pm 6.2$ ).

#### Clinical discriminant validity

Table II reports the results (mean  $\pm$  SD) for the 8 CHAQ domains, the disability index (DI) and the 2 VAS scores for parental assessment of pain and overall well-being. The CHAQ clinically discriminated between healthy subjects and JIA patients, with the systemic, polyarticular and extended oligoarticular subtypes having a higher degree of disability, pain, and a lower overall well-being when compared to their healthy peers.

Table III reports the CHQ results (mean  $\pm$  SD) for the 15 health concepts (see table for abbreviation) and summary scores. The CHQ clinically discriminated between healthy subjects and JIA patients, with the systemic onset, polyarticular onset and extended oligoarticular subtypes having a lower physical and psychosocial well-being when compared to their healthy peers.

## Cross cultural adaptation

The Italian CHAQ has already been published (8), and therefore it was revalidated in this study. The CHQ was fully cross-culturally adapted with 3 forward and 3 backward translations; there was a concordance with the original American English version of the CHQ in at least 2 out of 3 back translations for 68/99

# The Italian version of the CHAQ and CHQ / N. Ruperto et al.

Table I. Demographic and clinical characteristics of the Italian sample.

	Systemic onset $n = 63$	Polyarticular onset $n = 126$	Extended oligoart. n = 86	Persistent oligoart. n = 129	Healthy controls n =788
Age of the children <sup>1,2</sup>	8.3 ± 4.9	10.3 ± 5.1	8.3 ± 5.1	8.1 ± 4.1	11.5 ± 4.2
Disease duration <sup>1</sup>	$3.1 \pm 3.3$	$4.2 \pm 4.3$	$4.4 \pm 4.7$	$3.6 \pm 3.2$	
ESR <sup>1, 2</sup>	$50.9\pm33.2$	$35.8\pm26.0$	$41.4\pm27.6$	$22.9 \pm 21.7$	
MD VAS (0-10 cm) <sup>1,2</sup>	$4.5 \pm 3.4$	$5.2 \pm 2.9$	$4.6 \pm 2.7$	$2.0 \pm 2.8$	
No. swollen joints <sup>1,2</sup>	$5.4 \pm 7.1$	$8.2 \pm 8.5$	$4.3 \pm 3.7$	$1.0 \pm 0.9$	
No. joints with pain <sup>1, 2</sup>	$5.8 \pm 7.1$	$9.0 \pm 10.2$	$5.5 \pm 5.6$	$0.5 \pm 1.1$	
No. joints with limited range of motion <sup>1,2</sup>	$7.4 \pm 10.4$	$11.9 \pm 11.5$	$5.4 \pm 4.9$	$0.7 \pm 1.2$	
No. active joints <sup>1, 2</sup>	$6.3 \pm 7.5$	$10.8\pm10.1$	$6.0 \pm 4.9$	$1.0 \pm 1.1$	
Female <sup>3,4</sup>	34 (54%)	101 (80%)	72 (84%)	104 (81%)	405 (52%)
Persistent systemic features <sup>3</sup>	40 (78%)	0	0	0	
Antinuclear antibody <sup>3,4</sup>	8 (14%)	54 (44%)	76 (90%)	99 (77%)	
Rheumatoid factor <sup>3,4</sup>	2 (4%)	8 (7%)	2 (2%)	2 (2%)	
Chronic iritis <sup>3,4</sup>	0	6 (5%)	22 (27%)	21 (17%)	

 $^{1}$ Mean  $\pm$  SD;  $^{2}$ ANOVA p < 0.001 (except for disease duration where p=0.18);  $^{3}$ number and percentage;  $^{4}$ Chi-square p < 0.001 (except for rheumatoid factor where p = 0.18).

**Table II.** The 8 CHAQ domains (range 0-3), the disability index (DI) (range 0-3), and the 2 VAS scores (range 0-10 cm) for pain and parent assessment of the child's overall well-being. Lower scores indicate better functional ability. Values are expressed as means  $\pm$  SD.

	Systemic onset $n = 63$	Polyarticular onset n = 126	Extended oligoart. n = 86	Persistent oligoart. n = 129	Healthy controls n =788
Dressing	$1.2 \pm 1.2$	$1.3 \pm 1.1$	$0.8 \pm 1.1$	$0.5 \pm 1.0$	$0.5 \pm 0.9$
Arising	$0.9 \pm 1.1$	$0.9 \pm 1.0$	$0.7 \pm 0.8$	$0.2 \pm 0.5$	$0.0 \pm 0.2$
Eating	$0.7 \pm 1.0$	$0.7 \pm 1.0$	$0.5 \pm 0.8$	$0.3 \pm 0.8$	$0.1 \pm 0.5$
Walking	$1.0 \pm 1.1$	$0.8 \pm 1.0$	$0.8 \pm 0.9$	$0.3 \pm 0.6$	$0.0 \pm 0.2$
Hygiene	$1.0 \pm 1.2$	$0.9 \pm 1.0$	$0.8 \pm 0.9$	$0.3 \pm 0.8$	$0.1 \pm 0.5$
Reach	$1.1 \pm 1.1$	$1.1 \pm 1.0$	$0.8 \pm 0.9$	$0.4 \pm 0.8$	$0.1 \pm 0.4$
Grip	$0.9 \pm 1.0$	$0.8 \pm 1.0$	$0.6 \pm 0.9$	$0.2 \pm 0.6$	$0.1 \pm 0.3$
Activities	$1.0 \pm 1.0$	$1.0 \pm 1.0$	$1.0 \pm 0.9$	$0.5\pm0.8$	$0.4 \pm 0.8$
Disability index	$1.0 \pm 0.9$	$0.9 \pm 0.8$	$0.7\pm0.6$	$0.3 \pm 0.5$	$0.2 \pm 0.3$
Parent's evaluation of pain	$3.5 \pm 3.4$	$3.8 \pm 3.0$	$3.6 \pm 2.7$	$1.4 \pm 2.0$	$0.4 \pm 1.0$
Parent's evaluation of overall well-being	$2.8\pm2.7$	$3.9\pm2.8$	$3.4\pm2.7$	$1.5 \pm 1.8$	$0.5\pm1.4$

ANOVA p < 0.001 for all variables.

**Table III.** The 15 CHQ health concepts (and their abbreviations) and the 2 summary scores. Higher score indicates better physical or psychosocial well being (range 0-100). Values are expressed as means  $\pm$  SD.

	Systemic onset $n = 63$	Polyarticular onset $n = 126$	Extended oligoart. n = 86	Persistent oligoart. n = 129	Healthy controls n =788
Global health (GGH)	53.3 ± 25.4	$46.2 \pm 24.5$	51.4 ± 22.9	$67.2 \pm 19.9$	85.4 ± 16.1
Physical functioning (PF)	$55.9\pm36.9$	$58.7 \pm 35.5$	$64.1\pm28.9$	$83.1 \pm 26.5$	$96.7 \pm 11.9$
Role/social limitations - Emotional/Behavioural (REB)	$61.7\pm39.7$	63.7 ± 35.1	$68.8\pm32.8$	$86.1\pm24.7$	$95.8 \pm 15.0$
Role/social limitations - Physical (RP)	$60.9\pm40.2$	$62.4\pm35.6$	$66.9\pm33.6$	$88.1\pm23.7$	$95.3 \pm 15.5$
Bodily pain/discomfort (BP)	$55.1 \pm 33.9$	$51.8\pm28.8$	$49.4 \pm 27.3$	$77.2 \pm 24.6$	$88.3 \pm 17.0$
Behaviour (BE)	$75.0\pm17.5$	$72.6 \pm 17.8$	$76.6 \pm 15.5$	$78.7 \pm 14.1$	$81.2\pm14.3$
Global behaviour (GBE)	$71.8\pm26.0$	$62.6\pm25.0$	$71.6\pm20.6$	$72.2 \pm 22.0$	$80.1\pm18.6$
Mental health (MH)	$61.9\pm23.1$	$63.9\pm20.3$	$63.0\pm19.4$	$73.3 \pm 18.8$	$74.9 \pm 15.8$
Self esteem (SE)	$70.8\pm20.9$	$70.6 \pm 18.3$	$74.5 \pm 17.9$	$79.1 \pm 14.2$	$78.0 \pm 16.4$
General health perceptions (GH)	$54.1\pm20.9$	$52.4\pm20.0$	$55.0 \pm 16.4$	$63.7 \pm 16.6$	$78.5 \pm 13.9$
Change in health (CH)	$56.4\pm38.3$	$47.7\pm33.2$	$48.2\pm35.1$	$70.7\pm26.5$	$59.7 \pm 18.3$
Parental impact - Emotional (PE)	$48.7\pm31.2$	$48.4\pm27.6$	$52.8\pm24.0$	$65.9\pm26.7$	$76.5\pm24.2$
Parental impact - Time (PT)	$63.5\pm36.0$	$67.3\pm32.5$	$69.3\pm30.1$	$85.2\pm23.8$	$92.1 \pm 17.9$
Family activities (FA)	$71.8\pm28.4$	$77.5\pm22.9$	$72.4\pm24.8$	$88.0 \pm 15.2$	$91.8 \pm 13.1$
Family cohesion (FC)	$75.6\pm20.4$	$68.9 \pm 24.5$	$69.1\pm20.8$	$72.6 \pm 19.1$	$73.2\pm22.2$
Physical summary score (PhS)	$41.3 \pm 13.4$	$41.6 \pm 11.4$	$42.2\pm10.4$	$49.6\pm8.6$	$54.5\pm4.3$
Psychosocial summary score (PsS)	$46.4\pm10.9$	$45.8\pm9.6$	$46.5\pm8.1$	$49.8\pm7.6$	$51.2\pm7.7$

ANOVA p < 0.001 except for FC (p=0.14).

# (69%) lines of the translations. *Probe technique*

For the 69 lines of the translated CHAQ, all the lines of translation were understood by more than 80% of the 20 parents tested (median = 90%; range: 80-95%). For the 99 lines of the translated CHQ, all the lines of translation were understood by more than 80% of the parents (median = 85%; range: 80-95%). No change in the text of the Italian CHAQ-CHQ was necessary.

### Psychometric issues

Descriptive statistics (first Likert assumption). For the CHAQ the total number of missing responses was 6.6% (range 1.3-12.6) with dressing and activity having more than 10% missing values; the response pattern were skewed towards normal functional ability. All response choices of the CHAQ items have been used. The mean  $\pm$  SD of the items within a scale were roughly equivalent except for dressing, and activities. The total number of missing responses on the CHQ was 3.5% (2.6-7.2) with SE being the health concept with more missing values; the response pattern was most often skewed towards normal physical and psychosocial well-being. All response choices of the CHQ items have been used. The means  $\pm$  SD of the items within a scale were roughly equivalent except for BE and GH.

*Equal items-scale correlation (second Likert assumption).* Pearson items-scale correlations corrected for overlap were roughly equivalent for items within a scale for all of the CHAQ domains except for dressing, reach, and activities, and for all CHQ health concepts except for BE, MH, SE, and GH.

Items internal consistency (third Likert as sumption). Pearson items scale correlations were 0.4 for 100% of the CHAQ items and 90% of the CHO items (except BE, and GH). Items discriminant validity. For CHAQ, Pearson items correlations with its scale corrected for overlap were greater than at least 1 standard error (SE) of the correlation with other scales for 75% of the items (50% by 2 SE); scaling failure was observed for dressing, arising, eating, hygiene, reach, grip, and activities, where the items were better correlated with other domains (of note the scaling failures were not observed if only JIA children were considered). For CHO, Pearson items correlations were greater by at least 1 SE for 98% of the items (93% by 2 SE); scaling failure was observed for GH, and PE.

*Floor and ceiling effect.* The CHAQ floor effect had a median of 92% (range 75-95%) while for the CHQ the median was 1% (range 0-3.7%). The CHAQ ceiling effect had median of 0.1% (range 0.0-0.5) while the CHQ had a median of 26% (range 4.9-77.5%).

*Cronbach's alpha internal consistency*. Cronbach's alpha was 0.7 for 8/8 (100%) domains of the CHAQ (overall 0.96; range 0.8-0.96). Cronbach's alpha was 0.7 for 10/11 (91%) measurable health concepts (*i.e.* health concepts with more than 1 item) of the CHQ

(overall 0.95; range 0.6-0.95) with the exception being GH (0.6).

*Inter scale correlation.* The Pearson correlation of each domain with all other domains of the CHAQ was lower than their Cronbach's alpha only for walking. For the CHQ all 11 measurable health concepts have correlation lower than their Cronbach's alpha except for GH.

Test-retest reliability. After a median of 6.5 days (range 2-16 days; number of JIA patients re-tested = 14) the intra-class correlation coefficients for the 8 CHAQ domains showed a fair to good reproducibility with a median of 0.9 (range 0.8-1.0). Most of the 15 CHQ health concepts had a fair to good reproducibility with a median of 0.7 (range 0.4-0.8). External validity. The Spearman correlation of the CHAQ with the JIA core set variables (9) showed a median of 0.6 (range 0.5 to 0.6), with the highest correlation being with the physician's evaluation of disease activity (r = 0.6). For CHQ the median correlation was for PhS -0.5 (range -0.6 to -0.4) and for PsS it was -0.3 (range -0.4 to -0.3). The best correlation was with the physician's evaluation of disease activity for PhS (-0.6) and the parent's evaluation of overall well being for the PsS (-0.4).

#### Discussion

The results of the present study show that the Italian versions of the CHAQ-CHQ have excellent psychometric properties.

This study focuses on revalidating the Italian version of the CHAQ already published by Fantini et al. (8). This disease-specific questionnaire proved its ability to clinically discriminate between the JIA subtypes and healthy controls, with the systemic, polyarticular and extended oligoarticular subtypes having a higher degree of disability, pain, and a lower overall well-being when compared to their healthy peers. The 2 most problematic domains were dressing and activities, which showed a high number of missing values, different means  $\pm$  SD, and an unequal item scale correlation. Discriminant validity was also problematic for most of the CHAQ domains, but interestingly these problems disappeared when only the JIA patients were analysed.

In this study the Italian CHO was fully cross-culturally adapted from the original American English version with 3 forward and 3 backward translations. The generic CHQ questionnaire proved less able to clinically discriminate between the different JIA types than the CHAQ; patients with systemic and polyarticular onset or extended oligoarticular subtypes were very similar in both the PhS and PsS scores, whereas the results for the persistent oligoarticular patients were more similar to the healthy population. Some minor statistical problems were found for the equal item scale correlation, the item internal consistency, and the ceiling effect for BE, and GH. Interestingly, the Italian items in GH showed the same problems described in the original American CHQ (low item discriminant validity, and low Cronbach's alpha); this is thought to be due to the difficulty in asking questions about generic concepts such as general health perception.

In conclusion, the Italian version of the CHAQ-CHQ are reliable and valid tools for the functional, physical and psychosocial assessment of children with JIA.

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