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VALIDATION STUDIES

The Danish version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR)

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Abstract
The Juvenile Arthritis Multidimensional Assessment Report (JAMAR) is a new parent/patient-reported outcome measure that enables a thorough assessment of the disease status in children with juvenile idiopathic arthritis (JIA). We report the results of the cross-cultural adaptation and validation of the parent and patient versions of the JAMAR in the Danish language. The reading comprehension of the questionnaire was tested in ten JIA parents and patients. Each participating centre was asked to collect demographic, clinical data and the JAMAR in 100 consecutive JIA patients or all consecutive patients seen in a 6-month period and to administer the JAMAR to 100 healthy children and their parents. The statistical validation phase explored descriptive statistics and the psychometric issues of the JAMAR: the three Likert assumptions, floor/ceiling effects, internal consistency, Cronbach's alpha, interscale correlations, test–retest reliability and construct validity (convergent and discriminant validity). A total of 303 JIA patients (7.9% systemic, 35% oligoarticular, 22.1% RF negative polyarthritis, 35% other categories) and 99 healthy children, were enrolled in three centres. The JAMAR components discriminated well healthy subjects from JIA patients. All JAMAR components revealed good psychometric performances. In conclusion, the Danish version of the JAMAR is a valid tool for the assessment of children with JIA and is suitable for use both in routine clinical practice and clinical research.

Keywords Juvenile idiopathic arthritis · Disease status · Functional ability · Health-related quality of life · JAMAR

Introduction

The aim of the present study was to cross-culturally adapt and validate the Danish parent, child/adult version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR) [1] in patients with juvenile idiopathic arthritis (JIA). The JAMAR assesses the most relevant parent/patient-reported outcomes in JIA, including overall well-being, functional status, health-related quality of life (HRQoL), pain, morning stiffness, disease activity/status/course, articular and extra-articular involvement, drug-related side effects/compliance and satisfaction with illness outcome.

This project was part of a larger multinational study conducted by the Paediatric Rheumatology International Trials Organisation (PRINTO) [2] aimed to evaluate the epidemiology, outcome and treatment of childhood arthritis (EPOCA) in different geographic areas [3].

We report herein the results of the cross-cultural adaptation and validation of the parent and patient versions of the JAMAR in the Danish language.

The local members of the Paediatric Rheumatology International Trials Organisation (PRINTO) participating in the project are listed in the dedicated tables no. 2 and 3 of "https://doi.org/10.1007/s00296-018-3944-1 / Cross-cultural adaptation and psychometric evaluation of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR) in 54 languages across 52 countries: review of the general methodology".

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Materials and methods

The methodology employed has been described in detail in the introductory paper of the supplement [4]. In brief, it was a cross-sectional study of JIA children, classified according to the ILAR criteria [5, 6] and enrolled from January 2012 to February 2013. Children were recruited after Ethics Committee approval and consent from at least one parent.

The JAMAR

The JAMAR [1] includes the following 15 sections:

1. Assessment of physical function (PF) using 15 items in which the ability of the child to perform each task is scored as follows: 0 = without difficulty, 1 = with some difficulty, 2 = with much difficulty, 3 = unable to do and not applicable if it was not possible to answer the question or the patient was unable to perform the task due to their young age or to reasons other than JIA. The total PF score ranges from 0 to 45 and has three components: PF-lower limbs (PF-LL); PF-hand and wrist (PF-HW) and PF-upper segment (PF-US) each scoring from 0 to 15 [7]. Higher scores indicating higher degree of disability [8–10];
2. Rating of the intensity of the patient's pain on a 21-numbered circle Visual Analogue Scale (VAS) [11];
3. Assessment of the presence of joint pain or swelling (present/absent for each joint);
4. Assessment of morning stiffness (present/absent);
5. Assessment of extra-articular symptoms (fever and rash) (present/absent);
6. Rating of the level of disease activity on a 21-circle VAS;
7. Rating of disease status at the time of the visit (categorical scale);
8. Rating of disease course from previous visit (categorical scale);
9. Checklist of the medications the patient is taking (list of choices);
10. Checklist of side effects of medications;
11. Report of difficulties with medication administration (list of items);
12. Report of school/university/work problems caused by the disease (list of items);
13. Assessment of HRQoL, through the physical health (PhH), and psychosocial health (PsH) subscales (5 items each) and a total score. The four-point Likert response, referring to the prior month, are 'never' (score = 0), 'sometimes' (score = 1), 'most of the time' (score = 2) and 'all the time' (score = 3). A 'not assessable' column was included in the parent version of the questionnaire to designate questions that cannot be answered because of developmental immaturity. The total HRQoL score ranges from 0 to 30, with higher scores indicating worse HRQoL. A separate score for PhH and PsH (range 0–15) can be calculated [12–14];
14. Rating of the patient's overall well-being on a 21-numbered circle VAS;
15. A question about satisfaction with the outcome of the illness (Yes/No) [15].

Cross-cultural adaptation and validation

The process of cross-cultural adaptation was conducted according to international guidelines with 2–3 forward and backward translations. In those countries for which the translation of JAMAR had been already cross-culturally adapted in a similar language (i.e., Spanish in South American countries), only the probe technique was performed. Reading comprehension and understanding of the translated questionnaires were tested in a probe sample of ten JIA parents and ten patients.

Each participating centre was asked to collect demographic, clinical data and the JAMAR in 100 consecutive JIA patients or all consecutive patients seen in a 6-month period and to administer the JAMAR to 100 healthy children and their parents.

The statistical validation phase explored the descriptive statistics and the psychometric issues [16]. In particular, we evaluated the following validity components: the first Likert assumption [mean and standard deviation (SD) equivalence]; the second Likert assumption or equal item–scale correlations (Pearson r: all items within a scale should contribute equally to the total score); third Likert assumption (item internal consistency or linearity for which each item of a scale should be linearly related to the total score that is 90% of the items should have Pearson $r \geq 0.4$); floor/ceiling effects (frequency of items at lower and higher extremes of the scales, respectively); internal consistency, measured by the Cronbach's alpha, interscale correlation (the correlation between two scales should be lower than their reliability coefficients, as measured by Cronbach's alpha); test–retest reliability or intraclass correlation coefficient (reproducibility of the JAMAR repeated after 1 or 2 weeks); and construct validity in its two components: the convergent or external validity which examines the correlation of the JAMAR subscales with the six JIA core set variables, with the addition of the parent assessment of disease activity and pain by the Spearman's correlation coefficients (r) [17] and the

discriminant validity, which assesses whether the JAMAR discriminates between the different JIA categories and healthy children [18].

Quantitative data were reported as medians with 1st and 3rd quartiles and categorical data as absolute frequencies and percentages.

The complete Danish parent and patient versions of the JAMAR are available upon request to PRINTO.

Results

Cross-cultural adaptation

The Danish JAMAR was fully cross-culturally adapted from the standard English version with two forward and two backward translations with a concordance for 105/123 translation lines (85.4%) for the parent version and 107/120 lines (89.2%) for the child version.

All 123 lines of the parent version of the JAMAR were understood by at least 80% of the ten parents tested (median = 100%; range 80–100%). All the 120 lines of the patient version of the JAMAR were understood by at least 80% of the children (median = 100%; range 80–100%). The text of the parent JAMAR was unmodified after the probe technique; even if not required by the methodology, the comments of the two children who did not understand line 107 of the child JAMAR were considered appropriate and the line was modified accordingly.

Demographic and clinical characteristics of the subjects

A total of 303 JIA patients and 99 healthy children (total of 402 subjects) were enrolled at three paediatric rheumatology centres.

In the 303 JIA subjects, the JIA categories were 7.9% with systemic arthritis, 35% with oligoarthritis, 22.1% with RF-negative polyarthritis, 5.6% with RF-positive polyarthritis, 6.3% with psoriatic arthritis, 12.9% with enthesitis-related arthritis and 10.2% with undifferentiated arthritis (Table 1).

A total of 343/402 (85.3%) subjects had the parent version of the JAMAR completed by a parent (267 from parents of JIA patients and 76 from parents of healthy children). The JAMAR was completed by 281/343 (81.9%) mothers and 62/343 (18.1%) fathers. The child version of the JAMAR was completed by 357/402 (88.8%) children aged 7.2 or older.

Discriminant validity

The JAMAR results are presented in Table 1, including the scores [median (1st–3rd quartile)] obtained for the PF, the PhH, the PsH subscales and total score of the HRQoL scales. The JAMAR components discriminated well between healthy subjects and JIA patients.

In summary, the JAMAR revealed that JIA patients had a greater level of disability and pain, as well as a lower HRQoL than their healthy peers.

Psychometric issues

The main psychometric properties of both parent and child versions of the JAMAR are reported in Table 2. The following "Results" section refers mainly to the parent's version findings, unless otherwise specified.

Descriptive statistics (first Likert assumption)

There were no missing results for all JAMAR items, since data were collected through a web-based system that did not allow to skip answers and input of null values. The response pattern for both PF and HRQoL was positively skewed toward normal functional ability and normal HRQoL. All response choices were used for the different HRQoL items except for item 8, whereas a reduced number of response choices was used for PF items 2, 9, 11, 12, 13 and 14.

The mean and SD of the items within a scale were roughly equivalent for the PF and for the HRQoL items, except for HRQoL item 1 (data not shown). The median number of items marked as not applicable was 2% (0–6%) for the PF and 7.5% (1–9%) for the HRQoL.

Floor and ceiling effect

The median floor effect was 84.3% (60.7–95.5%) for the PF items, 50.6% (22.1–79.0%) for the HRQoL-PhH items, and 61.8% (49.8–79.4%) for the HRQoL-PsH items. The median ceiling effect was 0.4% (0–1.9%) for the PF items, 4.1% (0.7–10.5%) for the HRQoL-PhH items, and 0.7% (0–3.7%) for the HRQoL-PsH items. The median floor effect was 25.1% for the pain VAS, 25.1% for the disease activity VAS and 23.6% for the well-being VAS. The median ceiling effect was 0% for the pain VAS, 0.7% for the disease activity VAS and 0.7% for the well-being VAS.

Equal item–scale correlations (second Likert assumption)

Pearson's items–scale correlations corrected for overlap were roughly equivalent for items within a scale for 87% of

Table 1 Descriptive statistics (medians, 1st–3rd quartiles or absolute frequencies and %) for the 303 JIA patients

	Systemic	Oligoarthritis	RF − polyarthritis	RF + polyarthritis	Psoriatic arthritis	Enthesitis-related arthritis	Undifferentiated arthritis	All JIA patients	Healthy
	N = 24	*N* = 106	*N* = 67	*N* = 17	*N* = 19	*N* = 39	*N* = 31	*N* = 303	*N* = 99
Female	11 (45.8%)	80 (75.5%)	57 (85.1%)	17 (100%)	16 (84.2%)	21 (53.8%)	20 (64.5%)	222 (73.3%)#	50 (50.5%)#
Age at visit	13.8 (10.5–15.3)	12.4 (9.5–14.8)	12.8 (9.9–14.6)	14.2 (13.1–15.5)	16.8 (11.4–18)	15.4 (14.1–17.7)	11 (6.2–14.2)	13.2 (10.1–15.6)#	12 (9.8–15.1)
Age at onset	8.5 (5.1–10.8)	4.1 (2.2–8.7)	4.7 (1.9–9.3)	11.4 (10–13.7)	11.6 (8.1–13.3)	9.8 (7.6–11.5)	5 (2.5–11.5)	7.2 (2.8–10.9)#	
Disease duration	4 (1.4–7)	6.3 (3–9.8)	6 (2.6–9.5)	2.2 (1.9–3.8)	3.7 (2.7–5.5)	4.6 (3.4–7.6)	3 (1.5–4.6)	4.7 (2.5–8.4)#	
ESR	5 (3–9)	7 (4–13)	7 (4–10)	16 (7–18)	8 (6–15)	8 (5–11)	6 (4–7)	7 (4–12)*	
MD VAS	0 (0–0)	0 (0–2)	0 (0–1)	2.5 (0–4)	1 (0–4)	0.5 (0–2)	0 (0–1)	0 (0–2)*	
No. of swollen joints	0 (0–0)	0 (0–1)	0 (0–1)	0 (0–1)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)*	
No. of joints with pain	0 (0–0)	0 (0–1)	0 (0–3)	1 (0–2)	0 (0–2)	1 (0–2)	0 (0–0)	0 (0–2)*	
No. of joints with LOM	0 (0–0)	0 (0–1)	0 (0–2)	1 (0–2)	0 (0–1)	0 (0–0)	0 (0–0)	0 (0–1)**	
No. of active joints	0 (0–0)	0 (0–1)	0 (0–1)	0 (0–1)	0 (0–1)	0 (0–0)	0 (0–0)	0 (0–1)*	
Active systemic features	2 (8.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (0.7%)	
ANA status	0 (0%)	25 (23.6%)	9 (13.4%)	2 (11.8%)	2 (10.5%)	0 (0%)	0 (0%)	38 (12.5%)**	
Uveitis	0 (0%)	11 (10.4%)	12 (17.9%)	0 (0%)	2 (10.5%)	4/38 (10.5%)	5 (16.1%)	34/301 (11.3%)	
PF total score	0.5 (0–6)	1 (0–4)	3 (0–6)	2 (0–3.5)	4 (1–9)	2 (0–5)	0 (0–2)	1 (0–5)*	0 (0–0)#
Pain VAS	1.5 (0–4.5)	2 (0–4.5)	3 (1–5)	1.5 (0.5–3.5)	3 (0.5–5)	1.5 (0.5–4)	1 (0–3)	2 (0–4.5)	0 (0–0)#
Disease activity VAS	1.5 (0–4.5)	1.5 (0–4)	2.5 (0.5–4.5)	1.5 (0.8–2)	3.5 (1.5–5.5)	1 (0.5–3.5)	1 (0–3)	2 (0–4)	
Well-being VAS	1.5 (0–3)	1 (0–3.5)	2 (0.5–4)	1.8 (1–4)	2 (1.5–3.5)	2 (0.5–4)	1 (0–3)	1.5 (0.5–3.5)	
HRQoL-PhH	3 (0–6)	2 (1–5)	4 (2–6)	2 (1–4.5)	6 (4–7)	3 (2–5)	2 (1–5)	3 (1–5)	0 (0–0)#
HRQoL-PsH	2 (0–5)	1 (0–4)	2 (0–4)	1 (0.5–2)	2 (2–4)	1 (0–4)	1 (0–3)	2 (0–4)	0 (0–0.5)#
HRQoL total score	5 (0–10)	4 (1–9)	6 (4–10)	3.5 (2–7)	9 (6–11)	6 (3–8)	4 (2–8)	5 (2–9)	0 (0–1)#
Pain/swell in > 1 joint	8/22 (36.4%)	44/95 (46.3%)	35/61 (57.4%)	9/16 (56.3%)	8/13 (61.5%)	17/29 (58.6%)	11 (35.5%)	132/267 (49.4%)	5/76 (6.6%)#
Morning stiffness > 15 min	6/22 (27.3%)	30/95 (31.6%)	22/61 (36.1%)	4/16 (25%)	4/13 (30.8%)	11/29 (37.9%)	3 (9.7%)	80/267 (30%)	0 (0%)#
Subjective remission	12/22 (54.5%)	54/95 (56.8%)	43/61 (70.5%)	11/16 (68.8%)	11/13 (84.6%)	18/29 (62.1%)	16 (51.6%)	165/267 (61.8%)	
In treatment	19/22 (86.4%)	69/95 (72.6%)	52/61 (85.2%)	16/16 (100%)	12/13 (92.3%)	28/29 (96.6%)	24 (77.4%)	220/267 (82.4%)	
Reporting side effects	7/19 (36.8%)	32/69 (46.4%)	28/52 (53.8%)	11/16 (68.8%)	9/12 (75%)	9/28 (32.1%)	11/24 (45.8%)	107/220 (48.6%)	
Taking medication regularly	18/19 (94.7%)	68/69 (98.6%)	51/52 (98.1%)	15/16 (93.8%)	11/12 (91.7%)	27/28 (96.4%)	23/24 (95.8%)	213/220 (96.8%)	
With problems attending school	6/17 (35.3%)	13/56 (23.2%)	11/34 (32.4%)	3/10 (30%)	4/7 (57.1%)	7/14 (50%)	1/13 (7.7%)	45/151 (29.8%)	0 (0%)#
Satisfied with disease outcome	17/22 (77.3%)	70/95 (73.7%)	42/61 (68.9%)	11/16 (68.8%)	7/13 (53.8%)	20/29 (69%)	21 (67.7%)	188/267 (70.4%)	

Data related to the JAMAR refers to the 267 JIA patients and to the 76 healthy subjects for whom the questionnaire has been completed by the parents. *p* values refers to the comparison of the different JIA categories or to JIA versus healthy. $*p < 0.05$, $**p < 0.001$ $^{\#}p < 0.0001$

JAMAR Juvenile Arthritis Multidimensional Assessment Report, *ESR* erythrocyte sedimentation rate, *MD* medical doctor, *VAS* Visual Analogue Scale (score 0–10; 0 = no activity, 10 = maximum activity), *LOM* limitation of motion, *ANA* anti-nuclear antibodies, *PF* physical function (total score ranges from 0 to 45), *HRQoL* health-related quality of life (total score ranges from 0 to 30), *PhH* physical health (total score ranges from 0 to 15), *PsH* psychosocial health (total score ranges from 0 to 15)

Table 2 Main psychometric characteristics between the parent and child version of the JAMAR

	Parent $N = 267/343$	Child $N = 76/357$
Missing values (1st–3rd quartiles)	No missing values	No missing values
Response pattern	PF and HRQoL positively skewed	PF and HRQoL positively skewed
Floor effect, median		
PF	84.3%	87.2%
HRQoL-PhH	50.6%	58.9%
HRQoL-PsH	61.8%	60.1%
Pain VAS	25.1%	21.7%
Disease activity VAS	25.1%	26.7%
Well-being VAS	23.6%	29.4%
Ceiling effect, median		
PF	0.4%	0.0%
HRQoL PhH	4.1%	3.1%
HRQoL PsH	0.7%	1.6%
Pain VAS	0.0%	0.4%
Disease activity VAS	0.7%	0.8%
Well-being VAS	0.7%	1.5%
Items with equivalent item–scale correlation	87% for PF, 90% for HRQoL	93% for PF, 80% for HRQoL
Items with item–scale correlation ≥ 0.4	87% for PF, 100% for HRQoL	87% for PF, 90% for HRQoL
Cronbach's alpha		
PF-LL	0.82	0.79
PF-HW	0.87	0.75
PF-US	0.72	0.74
HRQoL-PhH	0.84	0.83
HRQoL-PsH	0.79	0.78
Items with item–scale correlation lower than the Cronbach's alpha	100% for PF, 100% for HRQoL	100% for PF, 100% for HRQoL
Test–retest intraclass correlation		
PF total score	0.92	0.92
HRQoL-PhH	0.59	0.85
HRQoL-PsH	0.81	0.63
Spearman's correlation with JIA core set variables, median		
PF	0.3	0.4
HRQoL-PhH	0.3	0.4
HRQoL-PsH	0.2	0.3
Pain VAS	0.3	0.3
Disease activity VAS	0.3	0.2
Well-being VAS	0.3	0.3

JAMAR Juvenile Arthritis Multidimensional Assessment Report, *JIA* juvenile idiopathic arthritis, *VAS* Visual Analogue Scale, *PF* physical function, *HRQoL* health-related quality of life, *PhH* physical health, *PsH* psychosocial health, *PF-LL* PF-lower limbs, *PF-HW* PF-hand and wrist, *PF-US* PF-upper segment

the PF items, with the exception of PF items 11 and 15, and for 90% of the HRQoL items, with the exception of item 1.

Item internal consistency (third Likert assumption)

Pearson's item–scale correlations were ≥ 0.4 for 87% of items of the PF (except for PF items 11 and 15) and 100% of items of the HRQoL.

Cronbach's alpha internal consistency

Cronbach's alpha was 0.82 for PF-LL, 0.87 for PF-HW, 0.72 for PF-US. Cronbach's alpha was 0.84 for HRQoL-PhH and 0.79 for HRQoL-PsH.

Interscale correlation

The Pearson's correlation of each item of the PF and the HRQoL with all items included in the remaining scales of the questionnaires was lower than the Cronbach's alpha.

Test–retest reliability

Reliability was assessed in 19 JIA patients, by re-administering both versions (parent and child) of the JAMAR after a median of 7 days (1–18 days). The intraclass correlation coefficients (ICC) for the PF total score showed an almost perfect reproducibility (ICC = 0.92). The ICC for the HRQoL-PhH showed a moderate reproducibility (ICC = 0.59), while the ICC for the HRQoL-PsH showed an almost perfect reproducibility (ICC = 0.81).

Convergent validity

The Spearman's correlation of the PF total score with the JIA core set of outcome variables ranged from 0.1 to 0.6 (median = 0.3). The PF total score best correlation was observed with the parent assessment of pain ($r = 0.6$, $p < 0.001$). The correlation of the PF total score with the ESR was not significant ($p = 0.35$). For the HRQoL, the median correlation of the PhH with the JIA core set of outcome variables ranged from − 0.04 to 0.8 (median = 0.3), whereas for the PsH ranged from − 0.1 to 0.6 (median = 0.2). The PhH showed the best correlation with the parent's assessment of pain ($r = 0.8$, $p < 0.001$) and the PsH with the parent global assessment of well-being ($r = 0.6$, $p < 0.001$). The median correlations between the pain VAS, the well-being VAS, and the disease activity VAS and the physician-centred and laboratory measures were 0.3 (0.1–0.5), 0.3 (0.1–0.4), and 0.3 (0.1–0.5), respectively.

Discussion

In this study, the Danish version of the JAMAR was cross-culturally adapted from the original standard English version with two forward and two backward translations. According to the results of the validation analysis, the Danish parent and patient versions of the JAMAR possess satisfactory psychometric properties. The disease-specific components of the questionnaire discriminated well between patients with JIA and healthy controls. The PF total score proved to discriminate between the different JIA subtypes with children with psoriatic arthritis having a higher degree of disability.

Psychometric performances were good for all domains of the JAMAR with few exceptions: two PF items (stretch arms and bite a sandwich or an apple) showed a lower item's internal consistency. However, the overall internal consistency was excellent for all the domains.

In the external validity evaluation, the Spearman's correlations of the PF and HRQoL scores with JIA core set parameters were modest.

The results obtained for the parent version of the JAMAR are very similar to those obtained for the child version, which suggests that children are equally reliable proxy-reporters of their disease and health status as their parents. The JAMAR is aimed to evaluate the side effects of medications and school attendance, which are other dimensions of daily life that were not previously considered by other HRQoL tools. This may provide useful information for intervention and follow-up in health care.

In conclusion, the Danish version of the JAMAR was found to have satisfactory psychometric properties and it is, thus, a reliable and valid tool for the multidimensional assessment of children with JIA.

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Compliance with Ethical Standards

Conflict of interest Dr. Zak, Dr. Myrup, Dr. Christensen, Dr. Nielsen, Dr. Herlin and Dr. Glerup report funding support from Istituto Giannina Gaslini, Genoa, Italy, for the translation phase and data collection performed at their sites within the EPOCA project. Dr. Ruperto has received Grants from BMS, Hoffman-La Roche, Janssen, Novartis, Pfizer, Sobi, during the conduct of the study and personal fees and speaker honorarium from Abbvie, Ablynx, Amgen, AstraZeneca, Baxalta Biosimilars, Biogen Idec, Boehringer, Bristol Myers Squibb, Celgene, Eli-Lilly, EMD Serono, Gilead Sciences, Janssen, Medimmune,

Novartis, Pfizer, Rpharm, Roche, Sanofi, Servier and Takeda. Dr. Consolaro and Dr. Bovis have nothing to disclose.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study as per the requirement of the local ethical committee.

References

1. Filocamo G, Consolaro A, Schiappapietra B, Dalpra S, Lattanzi B, Magni-Manzoni S et al (2011) A new approach to clinical care of juvenile idiopathic arthritis: the Juvenile Arthritis Multidimensional Assessment Report. J Rheumatol 38(5):938–953
2. Ruperto N, Martini A (2011) Networking in paediatrics: the example of the Paediatric Rheumatology International Trials Organisation (PRINTO). Arch Dis Child 96(6):596–601
3. Consolaro A, Ruperto N, Filocamo G, Lanni S, Bracciolini G, Garrone M et al (2012) Seeking insights into the epidemiology, treatment and outcome of childhood arthritis through a multinational collaborative effort: Introduction of the EPOCA study. Pediatr Rheumatol Online J 10(1):39
4. Bovis F, Consolaro A, Pistorio A, Garrone M, Scala S, Patrone E et al (2018) Cross-cultural adaptation and psychometric evaluation of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR) in 54 languages across 52 countries: review of the general methodology. Rheumatol Int. https://doi.org/10.1007/s00296-018-3944-1 **(in this issue)**
5. Petty RE, Southwood TR, Baum J, Bhettay E, Glass DN, Manners P et al (1998) Revision of the proposed classification criteria for juvenile idiopathic arthritis: Durban, 1997. J Rheumatol 25(10):1991–1994
6. Petty RE, Southwood TR, Manners P, Baum J, Glass DN, Goldenberg J et al (2004) International League of Associations for Rheumatology classification of juvenile idiopathic arthritis: second revision, Edmonton, 2001. J Rheumatol 31(2):390–392
7. Filocamo G, Sztajnbok F, Cespedes-Cruz A, Magni-Manzoni S, Pistorio A, Viola S et al (2007) Development and validation of a new short and simple measure of physical function for juvenile idiopathic arthritis. Arthritis Rheum 57(6):913–920
8. Lovell DJ, Howe S, Shear E, Hartner S, McGirr G, Schulte M et al (1989) Development of a disability measurement tool for juvenile rheumatoid arthritis. The Juvenile Arthritis Functional Assessment Scale. Arthritis Rheum 32:1390–1395
9. Howe S, Levinson J, Shear E, Hartner S, McGirr G, Schulte M et al (1991) Development of a disability measurement tool for juvenile rheumatoid arthritis. The Juvenile Arthritis Functional Assessment Report for children and their parents. Arthritis Rheum 34:873–880
10. Singh G, Athreya BH, Fries JF, Goldsmith DP (1994) Measurement of health status in children with juvenile rheumatoid arthritis. Arthritis Rheum 37:1761–1769
11. Filocamo G, Davi S, Pistorio A, Bertamino M, Ruperto N, Lattanzi B et al (2010) Evaluation of 21-numbered circle and 10-cm horizontal line visual analog scales for physician and parent subjective ratings in juvenile idiopathic arthritis. J Rheumatol 37(7):1534–1541
12. Duffy CM, Arsenault L, Duffy KN, Paquin JD, Strawczynski H (1997) The Juvenile Arthritis Quality of Life Questionnaire-development of a new responsive index for juvenile rheumatoid arthritis and juvenile spondyloarthritides. J Rheumatol 24(4):738–746
13. Varni JW, Seid M, Knight TS, Burwinkle T, Brown J, Szer IS (2002) The PedsQL(TM) in pediatric rheumatology—reliability, validity, and responsiveness of the Pediatric Quality of Life Inventory(TM) generic core scales and rheumatology module. Arthritis Rheum 46(3):714–725
14. Landgraf JM, Abetz L, Ware JE (1996) The CHQ user's manual, First edn. The Health Institute, New England Medical Center, Boston
15. Filocamo G, Consolaro A, Schiappapietra B, Ruperto N, Pistorio A, Solari N et al (2012) Parent and child acceptable symptom state in juvenile idiopathic arthritis. J Rheumatol 39(4):856–863
16. Nunnally JC (1978) Psychometric theory, 2nd edn. McGraw-Hill, New York
17. Giannini EH, Ruperto N, Ravelli A, Lovell DJ, Felson DT, Martini A (1997) Preliminary definition of improvement in juvenile arthritis. Arthritis Rheum 40(7):1202–1209
18. Ware JE Jr, Harris WJ, Gandek B, Rogers BW, Reese PR (1997) MAP-R for windows: multitrait/multi-item analysis program—revised user's guide. Version 1.0 ed. Health Assessment Lab, Boston

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