Scoring and interpreting the Parent Report of Children's Abilities-Revised (PARCA-R) questionnaire:

A Quick Reference Guide

PARCA-R Study Group

Scoring and interpreting the PARCA-R questionnaire comprises three steps:

1) Calculating raw scores

2) Deriving standard scores

3) Interpreting standard scores

Each of these steps is outlined below.

For more detailed information about scoring and interpreting the PARCA-R questionnaire, please download a free copy of the PARCA-R manual.

1) Calculating raw scores

Raw scores should be calculated separately for the non-verbal cognitive scale and the language scale. Raw scores can be calculated by hand following the instructions below, or electronically using the PARCA-R online questionnaire

1a) Calculating raw scores by hand

Follow the instructions below to calculate the non-verbal cognitive scale raw score and the language scale raw score.

Calculating the non-verbal cognitive scale raw score

The non-verbal cognitive scale comprises Questions 1-34 in the "Your child's play" section of the questionnaire. Responses to each of these items should be scored as follows:

Yes	= 1
No	= 0
Don't know	= 0

Sum the number of yes responses to give the total raw score for the non-verbal cognitive scale. Raw scores for this scale range from 0 to 34.

Scores for missing questions in the non-verbal cognitive scale can be substituted with the average of the score for completed questions if ≤ 4 questions are missing. If > 4 questions are missing, a non-verbal cognitive scale score cannot be calculated.

Calculating the language scale raw score

Calculating the language scale raw score requires 3 steps, as follows:

1) Calculate the raw score for the vocabulary sub-scale by summing the number of words ticked in the "What your child can say" checklist. Vocabulary sub-scale raw scores range from 0 to 100.

Unchecked or unanswered words in the vocabulary sub-scale should be scored zero.

2) Calculate the raw score for the sentence complexity sub-scale. Sentence complexity sub-scale raw scores range from 0 to 24. To do this:

First, score responses to Questions 1 to 6 of the "How your child uses words" section, as follows:

Often	= 2
Sometimes	= 1
Not Yet	= 0

Sum the item scores to give a total score ranging from 0 to 12.

Second, score Questions 7 to 18 of the "How your child uses words" section, as follows:

Sentence A	= 0
Sentence B	= 1

Sum the item scores to give a total score ranging from 0 to 12

Third, sum the scores from Questions 1-6 and Questions 7-18 in order to give a total raw score for the sentence complexity sub-scale, ranging from 0 to 24.

Unchecked or unanswered items for the sentence complexity sub-scale should be scored zero.

3) To obtain the raw score for the language scale, sum the vocabulary and sentence complexity sub-scale scores. Language scale raw scores range from 0 to 124.

1b) Calculating raw scores electronically

Raw scores can be calculated electronically using the PARCA-R online questionnaire. Enter the parents' responses for each question into the online PARCA-R questionnaire to obtain the raw score for each scale.

2) Deriving standard scores

PARCA-R standard scores may be derived by hand using the instructions below, or using the PARCA-R online score calculator.

2a) Deriving standard scores by hand

Follow the instructions below to derive the non-verbal cognitive scale standard score and the language scale standard score

Standard scores can be obtained from the tables in Appendix B of the PARCA-R manual, freely available to download from the PARCA-R website.

To derive the standard scores, the child's (corrected or chronological) age at assessment in months and days, sex and raw scores are needed.

First, identify the appropriate table for the child's age and sex. Read down the first column to locate the child's raw score, then read along the row, to the right, to locate the corresponding standard score.

For example, to identify standard scores for a boy assessed at age 25 months and 5 days, with a raw score of 19 on the non-verbal cognitive scale and a raw score of 24 on the language scale:

i) First, identify the table in Appendix B for boys in the appropriate age range, in this case 24 months 16 days to 25 months 15 days (see Figure 1).

ii) Second, locate the raw score of 19 in the first column of the table and read across the row to locate the corresponding standard score for the non-verbal cognitive scale, in this case a score of 70.

ii) Third, locate the raw score of 24 in the first column of the table and read across the row to locate the corresponding standard score for the language scale, in this case a score of 84.

	Males: 24mo 16d to 25mo 15d					
	Non-verbal cognitive (raw scale range: 0-34)			Language development (raw scale range: 0-124)		
Raw score	Standard	Percentile	95% CI	Standard	Percentile	95% CI
0	49	<0.1	46 - 65	53	<0.1	49 - 61
1	49	<0.1	46 - 65	58	0.2	54 - 65
2	49	<0.1	46 - 65	61	0.5	57 - 68
3	49	<0.1	46 - 65	64	0.8	60 - 71
4	49	<0.1	46 - 65	66	1.2	62 - 73
5	49	<0.1	46 - 65	68	1.6	64 - 75
6	49	<0.1	46 - 65	69	2.0	65 - 76
7	49	<0.1	46 - 65	71	2.5	66 - 77
8	49	<0.1	46 - 65	72	3.1	67 - 79
9	49	<0.1	46 - 65	73	3.6	69 - 80
10	49	<0.1	46 - 65	74	4.2	69 - 81
11	50	<0.1	47 - 66	75	4.8	70 - 82
12	51	<0.1	48 - 67	76	5.4	71 - 82
13	53	0.1	50 - 68	77	6.0	72 - 83
14	55	0.1	52 - 70	77	6.7	73 - 84
15	58	0.2	54 - 73	78	7.3	74 - 85
16	61	0.4	57 - 75	79	8.0	74 - 85
17	64	0.8	59 - 78	80	8.8	75 - 86
18	67	1.3	62 - 81	80	9.5	76 - 87
19	**70**	**2.2**	**64 - 83**	81	10.2	76 - 87
20	73	3.5	67 - 86	82	11.0	77 - 88
21	76	5.5	70 - 89	82	11.7	77 - 89
22	79	8.2	73 - 91	83	12.5	78 - 89
23	82	12.0	75 - 94	83	13.3	78 - 90
24	~~86~~	~~17.6~~	~~78 - 97~~	**84**	**14.1**	**79 - 90**
25	89	23.5	81 - 100	84	15.0	79 - 91
26	93	31.4	84 - 103	85	15.8	80 - 91
27	97	40.9	88 - 106	85	16.6	80 - 92

Figure 1: Obtaining standard scores using the norms table in the manual.

2b) Deriving standard scores electronically

Standard scores may be derived electronically using the PARCA-R online score calculator (Figure 2).

To obtain standard scores using the online calculator, the child's sex, date of birth and date of assessment must first be entered, from which the child's chronological age will be automatically calculated.

To obtain a child's corrected age at assessment for preterm born children, enter the child's expected date of delivery in place of the child's date of birth.

The child's raw scores should then be entered, from which the standard scores will be calculated. A summary sheet detailing the child's scores is available to download or print.

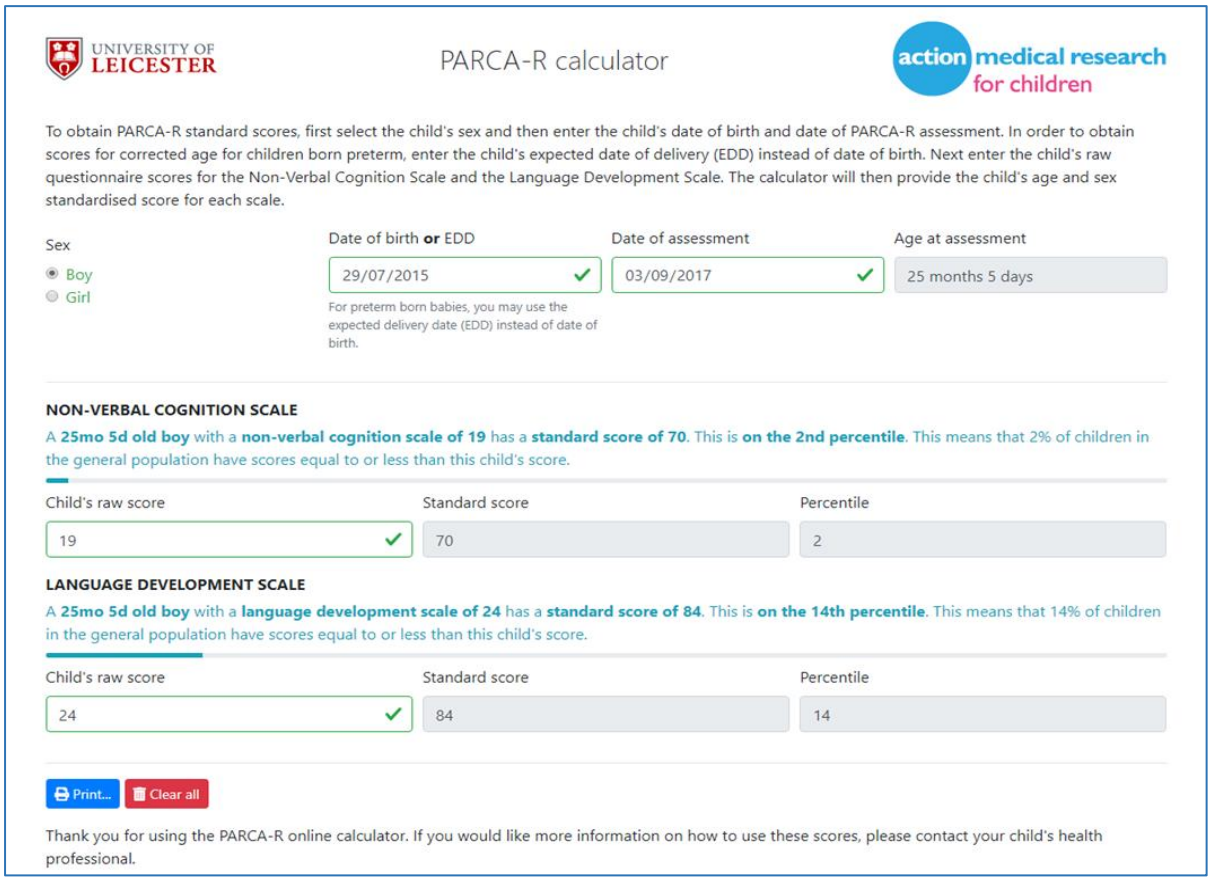

Figure 2 Screenshot of the PARCA-R online calculator and illustrative example.

3) Interpreting standard scores

PARCA-R standard scores are norm-referenced and can therefore be used to determine how far an individual's score differs from the mean of the standardisation sample. That is, standard scores can be used to compare an individual child's development with that of children of the same age and sex in the general population, and to identify children with advanced development or developmental delay.

Percentile ranks and confidence intervals corresponding with each standard score can also be derived from the tables in Appendix B of the manual. Percentile ranks indicate what proportion of the standardisation sample had scores lower than an individual child's observed score and can therefore be used to compare a child's developmental level with that expected for his or her age.

For example, a percentile rank of 45 indicates that 44% of children of the same age and sex in the general population had scores lower than that of the individual child being assessed.

In addition to identifying developmental delay, standard scores can also be used to identify children with advanced development. For example, a percentile rank of 95 indicates that the child being assessed had a score higher than 94% of children of the same age and sex in the general population.

As specific criteria for identifying delay and eligibility for early intervention services may differ between healthcare systems, relevant local or national guidelines for detecting developmental problems and disorders and classifying eligibility for intervention programmes should be consulted. For research purposes, and frequently in developmental follow-up, conventional definitions for identifying developmental delay using standardised test scores are applied using SD-banded cut-offs. For example:

Development in the average range: Standardised score -1 SD to < +1 SD; corresponding to standard scores 85 to 114.

Mild delay: Standardised score -2 SD to < -1 SD; corresponding to standard scores 70 to 84.

Moderate delay: Standardised score -3 SD to < -2 SD; corresponding to standard scores 55 to 69.

Severe delay: Standardised score < -3 SD; corresponding to standard scores of 54 or less.

Similarly, standard scores may be used to identify children with development above the average range, for example:

Above average: Standardised score +1 SD to < +2 SD; corresponding to standard scores 115 to 129.

Very above average: Standardised score ≥ +2 SD; corresponding to standard scores of 130 or above.

Standard scores for the non-verbal cognitive and language scales should be used separately to assess children's development and to classify delay in individual domains.

Eligibility for referral for diagnostic testing or intervention services should ultimately be made taking into account the results of other clinical assessments and in line with relevant local or national guidelines.

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