

TRANSLATION AND ADAPTATION OF THE REVISED DENVER PRE-SCREENING DEVELOPMENTAL QUESTIONNAIRE FOR MADINAH CHILDREN, SAUDI ARABIA

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A child's development is largely connected with environment, and so tools used in developmental assessment and screening should be modified to match the local environment of children. The experience and findings of such modifications is important to child health workers. The objectives of this study were to describe the method applied in translating the Revised Denver Pre-screening Developmental Questionnaire (R-PDQ) as a developmental screening tool, and to describe and analyze changes introduced to the R-PDQ after translation, adaptation and validation for Saudi children. To adapt the R-PDQ, three steps were taken: translation from English to Arabic using cross-translation method, piloting the Arabic translation on 65 children and mothers, and conducting the questionnaire on a random sample of 1219 children to introduce final necessary changes. The English R-PDQ went through major changes to make it valid for use in Saudi culture for evaluation of a child's development. Changes were made in the content of the questionnaire, age intervals, as well as normal age of developmental abilities and the order of acquiring them. Changes in the R-PDQ items were pertinent in language and personal-social items. No major changes were introduced in fine-motor or gross-motor items. This study demonstrates a model in adapting a developmental screening tool, and illustrates the need for standardization of "imported" developmental screening tools before using them. *Ann Saudi Med* 1998;18(1):42-46.

Developmental screening is an important measure for secondary prevention of disability. Its aim is early detection of potentially disabled children. Tools for developmental screening are available in different languages, and basically developed on Western standards. Intelligence and developmental screening tests such as the *Stanford Binet Intelligence Scale* and *Cattle Infant Intelligence Scale* are widely used, but they need special training and expertise. They are complicated and too time-consuming to be used for large-scale screening.

Using the reports of parents on their child's developmental status has been found to be appropriate and reliable.^{1,2} However, to develop a new screening test, there is a need to choose or invent developmental items, particularly social and language items, as reported by Frankenburg and Dodds.³ A certain number of items are needed in each of the important developmental domains, namely personal-social, language, fine-motor, and gross-motor. Too many items will make the test more difficult and costly. On the other hand, too few items in one or all domains will make the test less efficient in detecting

disability.⁴ In view of the difficulty in creating new local tools, the need for translation and adaptation of the available ones becomes real.

In the absence of Arabic tools in Saudi Arabia and other Arab countries, there is a need to translate and adapt the currently available tools to be used in assessment of child development. Translation and adaptation should take into account the cultural, traditional and environmental background of children.

The Denver Developmental Screening Test (DDST) was developed in 1967 by Frankenburg and Dodds,³ and validated in many studies.⁵⁻⁸ It was used in more than 50 countries, and adapted for more than 15 other countries.⁹ The Revised Denver Pre-screening Developmental Questionnaire (R-PDQ) was developed by modifying the DDST items into questions.¹⁰ Being simpler than the DDST, the R-PDQ reduces the cost of developmental screening. It also involves parents and awakens their interest in their child's development. For these and other reasons, the authors have chosen to standardize and adapt the R-PDQ.

The objectives of this study were to describe the method applied in the translation of the R-PDQ as a developmental screening tool, and to analyze changes introduced to the R-PDQ after translation, adaptation and validation on Saudi children. Establishing developmental norms is the step that followed translation. This was carried out by the authors and reported in a separate paper. After translation,

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Accepted for publication 26 October 1997. Received 23 July 1997.

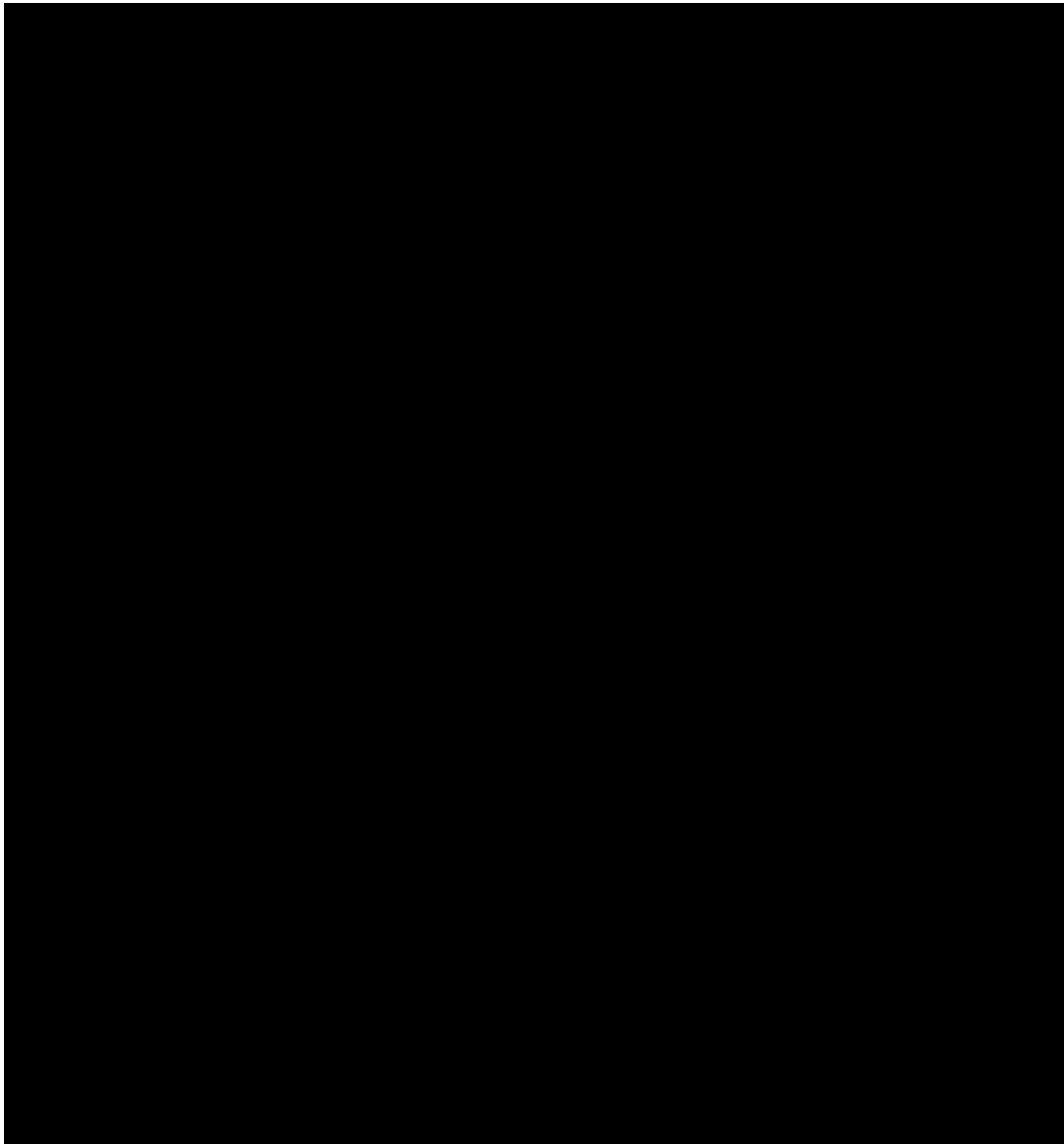


FIGURE 1. Example of the consecutive changes introduced to pictures in the R-PDQ form. The child is supposed to name these pictures.

adaptation, and standardization, the R-PDQ was made suitable for developmental screening in primary health care services, children's clinics, and research on developmental pediatrics.

Methods

In this study, translation, modification, and validation of the questionnaire was carried out through several steps: 1) Translation of the R-PDQ questions into Arabic by the authors. Classical Arabic language was used as it is widely understood. Translation included changing some of the questions to make them consistent with the children's community and their cultural background. In this step,

some changes were made to some personal-social items such as "Plays Pat-a-Cake," and "Plays Peek-a-Boo," (two common Western children's games) and various language items. Certain words found in the original English questionnaire were changed. For example: "curtain" was changed into "window," "lake" into "mountain," "desk" into "carpet," "fence" into "farm," "banana" into "date," and "pavement" became "car." The changes were derived from the environment of Saudi children in Madinah. Changes introduced were carried out at different stages of the study. In this early step of translation, figures found in the original R-PDQ were copied as they were. 2) Cross-translation method was used. Translation to Arabic was done by the authors. The Arabic R-PDQ was translated

back to English by a professional translator as well as an Arabic pediatrician who is competent in both languages and has an interest in developmental pediatrics. Both translators were blind to the original content of the questionnaire. 3) The translation back into English was matched with the original English R-PDQ. The two English versions were almost identical. 4) The questions were rearranged in a different chronological order from that of the original questionnaire. Reordering was based on the preliminary results of the pilot study, and the unpublished preliminary results of a study on the DSST, done in Riyadh by N. Al Naquib. 5) Final changes and reordering of the questions were done after completion of the main standardization study.

Piloting the questionnaire

The first investigator trained ten Arab-speaking nurses working in the well-baby clinics in six randomly selected primary health care centers (PHCC). Training included administration of the first Arabic version of the R-PDQ and how to use the DDST-kit. The first author himself received training on the R-PDQ and the DDST in Denver, Colorado, USA.

The pilot study included 65 children: 19 were aged 0-6 months, 15 were 6-18 months, 17 were 18 months-4 years, and 14 were in the 4-6-years age group. Children in the pilot study were not included in the main study.

During the training of nurses, the first investigator explained the study and every question in the Arabic R-PDQ and the expected answers. DDST kit items were demonstrated and nurses were trained in its uses. Practical training and piloting of the questionnaire took place at a non-study PHCC. Children and mothers were used during the training for the nurses to practice on.

Thirty R-PDQ forms were filled in under the supervision of the investigator. The rest of the forms were filled in by the nurses, and the results were discussed with the investigator. During the pilot study and training, the investigator kept a diary to document mothers' comments and children's reactions.

The investigator made sure that the performance required from the child in each item was clearly understood by the mother. This ensured that the translation was not only a literal translation from English to Arabic, but that it included comprehensible developmental tasks.

The PHCCs were selected randomly. A multi-stage stratified random sampling was applied to draw the study sample. The primary PHCCs in Madinah were divided arbitrarily into six different socioeconomic levels. One PHCC was randomly selected to represent each socioeconomic level.

Each well-baby clinic at a PHCC has a list of all children in its catchment area. Every childbirth has to be reported to the PHCC. This system is enforced by law, and

TABLE 1. *Distribution of children according to age groups and gender.*

Age (months)	Male	Female	Total
0-2	55	46	101
>2-4	56	49	105
>4-7	71	70	141
>7-10	54	58	112
>10-13	57	56	113
>13-18	63	59	122
>18-24	53	65	118
>24-36	60	66	126
>36-54	74	77	151
>54	61	67	128
Total	604	615	1219

TABLE 2. *Sample characteristics according to important variables.*

Residence (M/F)	
Urban	313 (49.2%)/323 (50.8%)
Rural	291 (49.9%)/292 (50.1%)
Total	604 (49.5%)/615 (50.5%)
Parents' education (mother's/father's)	
Illiterate	
Write and read	782 (64.1%)/484 (39.7%)
Intermediate, secondary or higher	311 (25.5%)/500 (41.0%)
	126 (10.3%)/235 (19.3%)
No. of children per family	
1-2	366 (30%)
3-6	573 (47%)
More than 6	280 (23%)
Socioeconomic	
High	146 (12%)
Middle	707 (58%)
Low	366 (30%)

no birth certificate can be issued without a notification of birth and a complete record of first-year immunizations. The study sample was derived from these lists using systematic random sampling. For better representation of children in the community, children were called to participate in the study, regardless of how frequently they used the PHCC services.

To make sure that only average children were included in the study, inclusion and exclusion criteria were established beforehand. Children with a birthweight of less than 2.0 kg were excluded, as were premature, twin, breech or cesarean-born children, and children with acute and chronic health problems. Only one child from each family was included to ensure maximum variation in socioeconomic backgrounds of children in the sample. The socioeconomic level of the family was based on the Kuppusswamy score that utilizes father's education, occupation and monthly income.¹¹ The score was modified to suit the local community.

Children from 10 age groups were chosen. Because children develop at a faster rate in early infancy, and at a slower rate in childhood, age groups were made shorter at the beginning, and longer towards the end of the six-year period. A tally sheet was used throughout the fieldwork to monitor the numbers of children included in each gender and age group. Assuming that only normal children were enrolled, there was no evident need to pre-screen children for various medical conditions.

Validation of this study was based on methodological design, inclusion and exclusion criteria, and reliability tests. To test for reliability, approximately 10% of the sample was repeated twice: once on the same child within one week for children less than 18 months of age, and within two weeks for children older than 18 months. The second type of reliability was tested by administering the questionnaire to the same child by the nurse and the first investigator.

It was necessary to revise a copy of the questionnaire into colloquial Arabic (not very different from classic Arabic), in order to simplify its use by nurses and mothers in Madinah.

Data were processed, coded, and fed to a personal computer. Analysis was done using Epi-info¹² and SPSS software.¹³ Cumulative frequency distribution was used to determine ages at which 25%, 50%, 75% and 90% of the children achieved each item. Kappa statistics were used to test reliability.¹⁴

Results and Discussion

The main study included 1219 randomly selected children from urban and rural Madinah. Table 1 shows their distribution in the 10 age groups. Table 2 shows their distribution according to gender and place of residence, parents' education, number of children in the family, and socioeconomic status of the family.

The final version of the questionnaire contained 104 items distributed on four differently colored forms. Each form covered an age interval between birth and six years. Each question was classified under one of the four main developmental domains. The questions were arranged in chronological order. Table 3 shows some examples of important standardized developmental abilities.

Item analysis was done by both authors throughout the study. Dr. William Frankenburg was also involved and advised that various changes be made. The decision on keeping, changing or discarding each item under discussion was based on facts shown in the pilot study, reliability tests, mothers' response and social acceptability. Changes were introduced throughout the pilot study, the main study, and after statistical analysis.

Differences between the original and the translated questionnaire included the following: 1) It was realized

TABLE 3. *Examples of standardized important developmental abilities.*

Developmental item	25%	50%	75%	90%
Personal item				
Smiles responsively	6.1 w	6.6 w	7 w	7.4 w
Holds rattle	3.3 m	3.7 m	4.2 m	4.3 m
Plays peek-a-boo	5.0 m	5.7 m	6.0 m	6.1 m
Resists toy pulling	5.6 m	6.3 m	8.3 m	8.9 m
Imitates housework	12.7 m	15.2 m	16.7 m	17.6 m
Washes and dries hands	2.3 y	2.75 y	3.1 y	3.3 y
Puts on clothes (unattended)	4.5 y	5.0 y	5.2 y	5.4 y
Buttons up	4.6 y	5.0 y	5.3 y	5.5 y
Fine-motor				
Bangs two cubes held in hands	8.8 m	10.5 m	12.0 m	12.2 m
Scribbles spontaneously	12.5 m	14.1 m	15.1 m	15.6 m
Builds tower of eight cubes	2.6 y	2.9 y	3.1 y	3.3 y
Copies circle	4.4 y	4.6 y	5.0 y	5.1 y
Draws a man in six parts	5.0 y	5.4 y	5.5 y	5.8 y
Language				
Turns towards voices	1.6 m	2.9 m	3.1 m	3.3 m
Dada, mama, nonspecific	7.5 m	8.3 m	8.9 m	9.3 m
Dada, mama, specific	10.7 m	12.0 m	12.7 m	13.5 m
Imitates words	10.8 m	12.1 m	12.5 m	14.1 m
Combines two different words	20.1 m	23.0 m	2.2 y	2.4 y
Names one picture	2.4 y	2.6 y	2.8 y	2.9 y
Recognizes colors	4.5 y	5.0 y	5.3 y	5.4 y
Gross-motor				
Pulls to sit with no head lag	3.0 m	3.5 m	4.2 m	4.3 m
Rolls over	5.0 m	5.6 m	6.0 m	6.1 m
Sits unsupported	6.0 m	6.2 m	6.3 m	6.8 m
Stands well alone	11.6 m	12.2 m	12.8 m	13.0 m
Walks well	12.0 m	12.7 m	14.1 m	14.6 m
Walks up steps	18.0 m	18.1 m	20.9 m	23.4 m
Hops on one foot	4.1 y	4.3 y	4.5 y	4.6 y

W=weeks; m=months; y=years.

that some of the words/sentences had to be translated into the colloquial Arabic of Madinah. The same had been done by Badri and Grotberg in Sudan.¹⁵ 2) Question number 88 from the original questionnaire was omitted for cultural reasons, as it referred to copying the shape of a cross. The total number of questions became 104. 3) The number of questions that are repeated at the end of one form and the beginning of the next was increased from three to five. This was done to make allowances for expected wide normal variation in children's development. 4) After the questionnaire was used, it was necessary to change the number of "no answers" after which the examiner stops asking questions. The number was increased from three to five. This was also done to compensate for expected wide normal variation. 5) After item analysis, it was necessary to change some pictures in the original R-PDQ to more suitable pictures in the final Arabic version. Figure 1 shows the successive changes made in the pictures throughout the study steps. 6) Final redistribution of the questions on the four Arabic R-PDQ forms was according to the norms derived from the main study. The distribution of questions on the four forms was almost the same as in the original R-DPQ. The aim was to distribute the 104 items equally on the four differently colored forms.

Distribution of forms was changed because we noticed that 29 out of the 104 items were acquired in the first six months. In the original English R-PDQ, 30 items were acquired in the first nine months, and so distribution was changed to count for "faster" and "early" child development in Madinah. Wider variation in child development in Madinah children, with both urban and rural settings, and variable socioeconomic backgrounds, necessitated an increase in the number of questions that overlap between forms.

Major changes were introduced in 7 out of 21 language questions, and 3 out of 23 personal-social questions. There was almost no modification in fine-motor (29) or gross-motor (31) items.

Reliability tests done between the principal investigator and nurses showed poor reliability in 4 out of 104 items. Reliability of repeating the R-PDQ items between the principal investigator and nurses for the same child showed the best reliability in language and fine-motor items, followed by gross-motor items. The least reliability was shown in personal-social items.

As a result of this study, a standardized questionnaire for evaluating child development has been prepared for the Madinah Region, Saudi Arabia, and could possibly be used in the Gulf and other Arab countries. This is the final form which the authors recommend for development screening purposes.

This study illustrates the need for adapting developmental screening tools before using them. This exercise may need to be replicated in other Arab communities to verify and generalize its use on a wider scale. The final form of the complete R-PDQ in Arabic is available from the authors.

Acknowledgments

This study was supported by a grant from Prince Salman Center for Disability Research, Riyadh, Saudi

Arabia. The authors wish to thank Professor William K. Frankenburg, Professor Emeritus of Pediatrics and Preventive Medicine, Department of Pediatrics, University of Colorado Health Science Center, for his great help with designing, conducting, and writing this research.

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